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FINAL NEOLITHIC AND EARLY BRONZE AGE SETTLEMENT IN THE SOUTHERN AEGEAN: A COMPARATIVE SPATIAL ANALYSIS OF THREE REGIONAL SURVEYS

By

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Thesis submitted to the University of London
for the Degree of Doctor of Philosophy

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To my parents

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ABSTRACT

This thesis investigates changing regional demography and settlement patterns in the southern Aegean during the Final Neolithic and Early Bronze Age (c. 4200-2000 BC, henceforth FN-EBA). It draws in detail on three survey datasets, from Kythera, Methana and the southern Argolid, and explores them within a GIS-led analytical environment.

Over the course of the 4th-3rd millennia BC, the southern Aegean experienced a gradual increase in settlement, that resulted in an FN-EBA landscape dotted with small communities (also extending into the more marginal areas) and a few larger settlements. Modern commentators have emphasised that population increase and its impact on settlement increase and expansion, as well as the deployment of new subsistence strategies and the development of complex socio-political frameworks, led to the formation of the later palatial societies in the Aegean. Hence, the EBA in particular has often attracted attention as the precursor of the palatial periods, even though the archaeology suggests that FN-EBA developments followed trajectories which were not always linear and which did not necessarily conform to the traditional regional divisions of the Aegean.

The character and distribution of FN-EBA sites, on both localised and more regional scales, need to be re-examined, and this is now possible for the following reasons: the current availability of high quality intensive survey data has finally enabled an investigation of demography and its impact on settlement and socio-economic strategies, through the investigation of the spatial distributions of sites and the relationship between the human and natural landscapes; the use of Geographical Information Systems has made possible a new comparative approach for the analysis of site distributions within a landscape and has allowed for a better understanding of the reasons behind settlement location, such as land quality, water resources, slope or coastal proximity, and of inter-settlement relationships. This research utilises these advances within a methodological framework that addresses issues of survey comparability and site characterization, in an aim to explore the factors influencing FN-EBA settlement and demography in the southern Aegean.

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CHAPTER 1

Introduction

1.1 Data and approaches for the investigation of the Final Neolithic and Early Bronze Age in the southern Aegean

The Early Bronze Age in the Aegean (henceforth EBA) has primarily been seen as the predecessor to the 2nd millennium BC state societies on Crete and the Mainland. Archaeological investigations in the late 19th and the greater part of the 20th centuries brought to light aspects of what was seen as the opening scene of Bronze Age developments, whose complexity and sophistication culminated in the creation of the Cretan and Minoan palaces. In 1972, the publication of *The Emergence of Civilisation* (henceforth *Emergence*) by Colin Renfrew was the first notable attempt to bring all the available EBA data together to explore the processes that took place across the Aegean. This work introduced new methodological and theoretical frameworks and inspired much of the subsequent archaeological research into the Aegean Bronze Age (e.g. Barrett & Halstead 2004). However, the available dataset at the time was rather limited and, to an extent as a result of this, the *Emergence* adopted an overwhelmingly continuous and unilinear framework. The element of continuous growth was openly rejected for the first time in the early 1980s (Cherry 1983a; 1984b), and the last few years have seen a call for the consideration of multilinear Aegean trajectories (Whitelaw 2004).

Such temporal and spatial diversity can only be explored adequately through detailed region-specific data, which cannot be derived solely from the relatively limited number of excavations or the erratic identification of sites across a landscape through use of local knowledge or informal explorations. However, the last three to four decades have seen an explosion of intensive regional surveys, which have produced a mass of new data that have greatly enhanced our understanding of regional landscapes and complement the stratified data from excavations. Within solid analytical frameworks these data can be used to explore local processes of changing demography and settlement patterns (with reference to the spatial distributions of sites and the relationship between the human and natural landscapes) and the way in which these worked to produce what is actually a very complex picture of Aegean socio-economic and political development. The influx of new data has also been accompanied by an enhanced understanding of material culture through the use of new analytical methods that allow for the extraction of information from the wider cultural assemblage (e.g. microscopic fabric analysis) and through more focused research questions that make the most of the available data. Furthermore, the last decade or so has seen the introduction of digital environments, such as Geographical Information Systems (GIS), geared towards the synthesis and analysis of archaeological and other related multi-disciplinary spatial datasets. These have made possible new approaches for the exploration of site distributions across a landscape and help to explain some of the reasons behind settlement location, such as land quality, water resources, slope or coastal proximity, and inter-settlement relationships.

The contribution of intensive survey to archaeology is no longer disputed; several surveys have been published in recent years and their results highlight the importance of regional analysis. However, there has been reluctance within Aegean archaeology to move beyond isolated regional investigations towards a more integrative comparison of data from different areas (Alcock & Cherry 2004b). This has mainly been due to the existence of diverse and constantly evolving survey methodologies that hinder such comparisons and evoke a fear that one is comparing 'apples and oranges'. This problem is very real, particularly when placing surveys from the early years side by side with more recent ones, which differ greatly in their research designs, sampling methods and recording/collection practices. However, if we are really going to get to grips with the regionally complex and multi-faceted nature of Aegean long-term human patterns, it is essential that we find ways to compare region-specific data successfully.

One of the aims of this research has been precisely to address these problems and to find ways of making datasets comparable for more interregional investigations. This thesis investigates changing regional demography and settlement patterns in the southern Aegean during the Final Neolithic and Early Bronze Age (c. 4200-2000 BC, henceforth FN-EBA). It draws in detail on three survey datasets, from Kythera, Methana and the southern Argolid (the Fournoi Valley specifically), and explores them within a GIS-led analytical environment (fig. 1.1). The FN has been included for two reasons: from a typological point of view the FN and EB I are difficult to separate archaeologically (cf. section 1.2) and, more importantly, many of the phenomena observed during the EBA, such as settlement expansion/dispersal and demographic growth, began in the FN and therefore its inclusion allows for a more comprehensive analysis. The focus is placed on the FN-EBA in its own right, rather than as the predecessor to later palatial developments. Regional survey lends itself to the investigation of rural landscapes and therefore this research takes a subsistence-oriented, economic perspective and assesses the human-environment relationships and, in particular, the recursive relationship between subsistence strategies and social structures on both localised and more regional scales.

The next section of this introduction addresses issues of FN-EBA chronology and sets a uniform chronological background for subsequent analyses and discussions. Chapter 2 looks at the general archaeological patterns observed during the FN-EBA and a number of subsistence-oriented explanatory models formulated to understand such patterns in the Aegean and, in one case, the wider context of the Old World. These models are explored in relation to the available data and in the context of subsistence strategies and risk management and their socio-economic impact on communities at different levels (household, settlement and settlement network). The chapter further focuses on the role of regional variation on such phenomena, as well as the importance of defining analytical regions for a better understanding of the human/landscape interaction within landscape formation, cultural ecology and human agency. Chapter 3 deals with aspects of survey methodology, in particular its development and effect on data quality, and the ability to compare survey datasets. It also discusses the development of GIS in archaeology and its potential for landscape analysis. Finally, the chapter introduces the three surveys, in terms of their specific methodologies and resulting datasets, and sets the criteria for their selection and ways of calibrating the data for successful comparison. Data analysis is the focus of Chapters 4-7 (Kythera is broken up into Chapters 4 and 5). In all three cases the analysis can be divided into three main areas: the measurement of the integrity of cultural assemblages in the landscape, in terms of geomorphological processes and the different preservation affecting the archaeological material itself; an assessment of the information available within each dataset, in terms of site definition (particularly chronology, size and function) and the wider archaeological landscape; and finally the exploration of settlement patterns, in terms of inter-settlement and settlement/landscape relationships. The investigation of each survey area begins with an introduction to its archaeological background and environmental setting and, in each case, the analyses are followed by detailed discussion of the results and their implications for local FN-EBA developments. The Kythera Island Project has formed the core dataset for analysis and therefore the methods used are discussed in more detail in Chapters 4 and 5. Chapter 8 evaluates the success of the analytical approaches followed, particularly in terms of survey comparability. It then moves on to thread together the three areas in order to address examples of varying regional FN-EBA patterns in the Aegean.

1.2 A note on FN-EBA chronology

The relative and absolute chronology of the later Neolithic and EBA phases has been a focus of debate for decades. The variations observed are partly a result of the emergence of individual site-specific chronological sequences. Absolute chronological divisions used in the thesis have been based primarily on Manning (1994; 1995), but also Renfrew (Renfrew 1972) and Warren & Hankey (Warren & Hankey 1989):

FN: 4200-3300 BC
EB I: 3300-2700 BC
EB II: 2700-2200 BC
EB III: 2200-2000 BC

One of the main chronological issues that concerns this thesis is the distinction between FN and EB I. A separation between these two phases is not always possible, particularly when dealing with cultural assemblages in areas where there is no excavated and stratified sequence. The term FN was first introduced by Renfrew (1972: 63, 68-80) to describe the period between the Late Neolithic (henceforth LN) and the EBA. It has been met with scepticism by some because of its substantial length and lack of uniformity, and other terms have been suggested as alternatives, such as LN II (Coleman 1992: 252, 259; Sampson 1989: 712). The term 'Final Neolithic' was further promoted by Phelps (1975; 2004: 6-7) to mark the end of the LN and the transition to EB I.

Although it remains useful to apply the term FN in some regional cases, the poor preservation rates of many FN and EB I ceramics render the distinction between the two phases particularly problematic for survey material. Out of the three areas investigated here, only the Argolid Exploration Project has been able to differentiate between the two phases (Pullen 1995), and therefore it was decided to explore them together as one in all three areas. This is not simply a way of avoiding the problem, as the similarities between FN and EB I processes and the differences between those of the FN and the LN further suggest that this grouping is reasonable from a wider interpretive perspective.

The main issue for the EBA period is the use of region-specific and site-specific nomenclature. The use of a single independent terminology allows the direct comparison between different areas within the Aegean. The main chronological divisions (I, II and III) that prevail in all three traditional regions in the southern Aegean (Mainland, Crete and the Cyclades) are broadly contemporary, and therefore for the purpose of uniformity in the thesis, the more general term 'Early Bronze' (EB) has been used for the chronological phases, whereas the terms 'Early Helladic' (EH), 'Early Minoan' (EM) and 'Early Cycladic' (EC) have been used only for the description of cultural assemblages.

Further issues concern the varying degree to which certain ceramic types are chronologically diagnostic. Red slipped and burnished pottery on the Mainland is primarily an EB I marker, but it can sometimes extend up to the earliest EB II. Similarly, orange micaceous pottery on Kythera dates primarily to EB II, but its use by some communities on the island seems to extend well into the EB III phase (Kiriatzi 2003). Furthermore, the Cretan-influenced First Minoanising pottery dates primarily to EB III, but it may also extend into the early stages of the Middle Bronze Age (henceforth MBA), i.e. up to the end of Crete's Middle Minoan (MM) IA. These are the key chronological concerns of this thesis, which will be addressed in more detail later on (cf. Chapters 4, 6 and 7).

CHAPTER 2

The Final Neolithic and Early Bronze Age in the Aegean: Approaches, models and interpretations of the archaeological record

2.1 The FN-EBA in the southern Aegean

The Aegean EBA (and sometimes the preceding FN) has attracted great attention, often not so much in its own right, but as the precursor of the Aegean palatial periods. More specifically, until recently, the formation of palatial societies was generally viewed as a result of unilinear long-term processes that took place over the preceding millennia (e.g. Branigan 1970; Renfrew 1972; for an alternative view cf. Cherry 1983; 1984; Whitelaw 2004). The evidence shows that over the course of the 4th-3rd millennia BC, the southern Aegean experienced a gradual increase in settlement (in terms of size and numbers), resulting in an EBA landscape dotted with small hamlets or farmsteads expanding into more marginal areas (i.e. areas with less agricultural potential in terms of soils, slope, precipitation or temperature) and interrupted by the presence of a few larger settlements (e.g. Halstead 1994: 200; 1996a: 27; Renfrew 1972; Wiencke 1989). Modern commentators have taken this pattern to imply population growth accompanied by new subsistence strategies and more complex socio-political frameworks (Gamble 1982; Halstead 1992; Halstead & O'Shea 1982; Manning 1994; Renfrew 1972; 1982; Sherratt 1981). In line with these opinions, a series of models has been put forward to explain the processes that led to the development of social complexity and centralisation. Several of these address aspects of the human-environment relationship and, in particular, the recursive relationship between subsistence strategies and social structures.

The first section of this chapter discusses these various explanatory models, focusing specifically on how they explore the development of subsistence strategies within this social and environmental framework. The availability of adequate subsistence resources and the means to extract them is essential to human survival, and therefore procurement strategies on the one hand and the threat of shortage on the other will heavily influence the way society organises itself (Halstead & O'Shea 1989b: 1). Such influence will depend on the temporal and spatial scales of variability in production yields, including its relative intensity and predictability. Within this framework, the development of the EBA has often been regarded as tracing a fairly linear trajectory towards socio-cultural complexity. However, the late EB II and EB III destruction layers identified at several sites across the southern Aegean and the overall dearth of EB III settlement suggest that the developments taking place in pre-palatial societies were anything but smooth, whereas the earlier phases of the MBA are marked by regionally diverse processes that are succeeded by varying scales and timeframes of socio-cultural development (Broodbank 2000; Cherry 1983a; 1984b; Davis 1992; Forsén 1992; Halstead 1994; Rutter 1993; 2001; Watrous 1994; Whitelaw 2004). It therefore needs to be emphasised that the models are considered here within an investigation of FN-EBA subsistence and social interactions in their own right. The remaining sections evaluate the importance of subsistence risk and buffering strategies and their socio-economic impact on invariably small and often fairly dispersed communities in Aegean landscapes, focusing also on the importance of regional variation across the Aegean. The aim of this chapter is to set the background for a thorough investigation of changing regional settlement patterns in two distinct areas of the southern Mainland and on the island of Kythera during the FN-EBA.

2.2 Previous approaches to FN-EBA subsistence practices

2.2.1 Mediterranean polyculture

The first major approach to understanding the EBA was developed by Renfrew and has had lasting effects on subsequent investigations. In *The Emergence of Civilisation* (1972), Renfrew suggested that the introduction of Mediterranean polyculture (i.e. of the domesticated vine, olive and cereals) into the Aegean in the 3rd millennium BC would have transformed the basis for Aegean subsistence economy, which at the time centred on the household as the basic unit.

He looked back to the Neolithic to explain the introduction of farming as a package (cereals and pulses, sheep and goat, and in smaller numbers pig and cattle) across the Aegean around 7000 B.C. He described farming sites of that time as mainly open inland tell sites, where the exploitation of these domesticates was incorporated into the population's subsistence strategies, which also continued to include wild plants. This would have been accompanied by more efficient land use through diversification and intensification of plant and animal management. For example, he pointed out that increasing crop purity would have been an important trend, as it encourages both specialisation and crop rotation to regenerate the land (however, it should be noted that increasing crop purity during the LN is not supported by the evidence; Dennell 1974: 132; Halstead 1994: 201). Overall, he believed subsistence strategies to be flexible and sensitive to local environmental variation: the introduction of the olive and the vine in the EBA would have enabled the expansion into and exploitation of more marginal areas, and this ability to manage a wider range of environments would have been crucial for an area such as the Aegean, where the topography can be extremely variable (Renfrew 1972: 305).

According to Renfrew, the increase in exploitable land, as well as its more efficient management, would have resulted in an increase in production and a change in settlement patterns. These phenomena, along with the development of craft specialisation, would have resulted in major population growth, production of surplus, exchange, the accumulation of wealth and, inevitably, the development of social hierarchy. His approach was in part a reaction to Childe's more 'diffusionist' perspective. Childe had broadly suggested that local Aegean traditions were maintained, but major innovations were adopted from outside, particularly from the Near East (Childe 1925). Without completely rejecting the significance of the movement of people and ideas into the Aegean, Renfrew placed the emphasis on indigenous regional interaction, economy and innovation within the Aegean itself. He attempted this by exploring the idea of an Aegean culture system, the development of which would initially have required innovative changes in at least two of its subsystems, leading to mutual and cumulative interaction of all subsystems in what he termed the 'multiplier effect' (Renfrew 1972: 27-44).

Renfrew also stressed the development of craft specialisation and exchange as part of this systemic multiplier effect. He concluded that the division of trade and labour into specialist production areas, such as metallurgy and masonry, would have led to the accumulation of wealth, which would have encouraged social hierarchy. Although he did not believe that the Neolithic allowed for much wealth accumulation, the evidence suggested variation of wealth amongst individuals in the EBA (e.g. as seen from some Cycladic burials; Renfrew 1972: 370-371). He maintained that craft specialisation as such requires food production beyond the needs of basic production and works well in economies that involve forms of redistribution. Indeed, for Renfrew, empirical evidence indicated both the existence of surplus and a redistributive economy in the later stages of the MBA and in the Late Bronze Age (henceforth LBA) Aegean (Renfrew 1972: 383; 1982: 265).

Although Renfrew's investigation of the various aspects of Aegean material culture from the EBA onwards was an attempt to explain the processes that led to the development of palatial societies, he created a model that described the formative stages of this development, i.e. primarily during the EBA itself. Within this framework, the EBA household would have remained economically self-sufficient, but would originally have consumed most of its produce without storing significant surplus (Renfrew 1972: 387; 1982: 270). He described the first stages of exchange in terms of the movement of simple commodities on an 'inter-personal basis' within villages, a process which would have led to issues of ownership. It is the organisation and circulation of surplus within EBA villages that he believed would have led to the emergence of local chiefs (Renfrew 1972: 482). In fact, he suggested that the presence of seals and sealings in EM II Crete supports the existence of an expanding exchange system in the Aegean, within which the various seals would originally have represented individual households (Renfrew 1972: 387-388).

The model has been heavily criticised (Gamble 1979; Halstead 1989; 1992; Halstead & O'Shea 1989a; Renfrew 1982; Runnels & Hansen 1986; van Andel & Runnels 1988), not least with respect to the timeframe for the domestication of the olive and vine in the Aegean. The palaeobotanical evidence that has been identified since the model of polyculture was first proposed indicates that the olive and the vine were already present in the Aegean before the EBA, and although it is not easy to distinguish between the wild and domesticated species, it is even possible that domestication did not take place before the LBA (Hamilakis 1996; Runnels & Hansen 1986; Sallares 1991). The analysis of charcoal from Akrotiri on Thera has since confirmed olive cultivation (not necessarily domestication) during the EBA (Asouti 2003; FN olive cultivation has been suggested on the basis of pollen evidence from the Akrotiri peninsula on Crete by Moody *et al.* 1996). However, it has been suggested that the cultivation of vines and olive trees would have been small-scale (Halstead 2004: 193); irrespective of the mode and extent of their exploitation during the EBA, the high tolerance levels of most Mediterranean crops to a variety of environments do not allow us to single out the introduction of olive and vine as the catalyst for population movement into more marginal areas (Halstead 1994: 201). On a different note, the view that craft-specialisation is linked to the complex redistributive economies of the MBA and LBA Aegean has been brought into question by Perlès & Vitelli (1999), who argue for forms of craft-specialisation as far back as the Neolithic. Whitelaw has further indicated that the relationship between agricultural intensification and craft-specialisation is not the same across the southern Aegean, but its development is, in fact, highly variable and dynamic (Whitelaw 2004: 238).

It is clear that it is not just Renfrew's suggested subsistence strategies that have been disputed (crop diversity and new agricultural technologies), but also the explanation he provided for the adoption of these strategies in the first place, and the theoretical framework within which EBA developments were explained as a whole (Pullen 1992: 46). In fact, aspects of Renfrew's model have been reworked to create new propositions (Pullen 1992; van Andel & Runnels 1988). What is interesting is that although he described the development of the Aegean as a predictable process – 'Aegean prehistoric society evolved just as naturally and predictably as did Aegean craft technology' (Renfrew 1972: 403) – at some point he also acknowledged the role of the individual – 'the interactions among the subsystems of the society take place chiefly at the level of the individual, since the subsystems of a culture are defined ultimately by the activities of individuals' (Renfrew 1972: 496). However, the exploration of human agency did not really move beyond this acknowledgement: Chapter 19 of the *Emergence* addresses ideology and expression, not everyday decisions (though Barrett & Damilati (2004) discern the notion of human agency in Renfrew's emphasis on competition for the acquisition of status and prestige as a driving factor behind social change). 30 years later, Renfrew expressed his reservations regarding the usefulness of the concept of agency in understanding human development (Renfrew 2004: 258, 264).

Since the publication of the *Emergence*, research has brought many of its themes under scrutiny, but has also highlighted its lasting impact on subsequent efforts to understand Bronze Age processes in the Aegean (cf. papers in Barrett & Halstead 2004). Renfrew's model was pioneering, but the limitations posed by the available data in the early 1970s mean that these models need to be reconsidered in the light of the array of new data that have since been recovered.

2.2.2 Secondary products and pastoralism

In 1981, Sherratt described a *secondary products revolution* – i.e. the exploitation of already domesticated animals for traction, transport, dairy products and wool, and the adoption of pastoralism and transhumance or nomadism – as a central theme for Old World development (Sherratt 1981). According to Sherratt, the spread of these innovations in animal husbandry from northern Mesopotamia across western Eurasia corresponds with the beginning of the EBA, a time of change in settlement patterns and cultural traditions in many areas of Europe, and would have had major social and economic impact. The increased exploitation of secondary products would have led to agricultural extensification (of better and worse land), the creation of further cultivable land through grazing, surplus production, transport and exchange. This would have sustained population growth and the expansion of settlement into more marginal areas, enabling the creation of far more extensive settlement networks. Moreover, the secondary products would have been prime instigators in the development of concepts of land ownership and hence, eventually, greater social hierarchy (Sherratt 1981: 299).

Sherratt's approach assumes that the population of the Aegean as a whole would have readily embraced this form of livestock management as a package. However, the term *revolution* is potentially too dramatic – Renfrew (1972: 274), by contrast, described a gradual adoption of Mediterranean polyculture – and it is more likely that if such strategies were to be found in the Aegean, they would have been adopted a) gradually, b) not as a package, and c) in specific areas and population groups where the circumstances were particularly amenable.

The earliest possible evidence for the plough in the Aegean has been found at Tsoungiza in Nemea in the form of a figurine fragment that shows an ox and the beginning of a yoke across its neck (Pullen 1992). The plough would be most suitable for deep soils, a characteristic of the lowlands, and not for the thinner rockier ground of the more marginal areas (Halstead 1992). Areas such as the Cyclades, where arable land is not so abundant, would benefit little from the use of the plough, and in fact some suggest the intensive use of the hoe in small fields, a practice that would have continued from the Neolithic (Broodbank 2000: 82; Halstead 1994: 201). Pullen (1992: 48) suggests the employment of the plough for the upland settlements in the southern Argolid, but in this case he is describing locations that do not appear to be so marginal, i.e. in the sense of thin soils. But even in those areas where it was viable, it would still depend on the availability of cattle, the presence of appropriate lowland areas for grazing and the population's willingness to accept change. The requirements of traction animals, in terms of grazing, feeding and the time required to look after them, would have made their adoption a great investment for the average farmer, who would either have to own land for grazing or 'rent' land. Furthermore, the amount of land a single household could exploit, even with the plough, would depend on the available labour (human and traction animals) and time, based on the weather and the organisation of other household activities (Foxhall 2003: 79, 84 states that the maximum area a household could cultivate with the plough would be 4-5 ha, unless there was extra labour available, thus allowing for little surplus). However, if extra labour was available, the use of the plough would result in increased productivity through the extensive cultivation of much broader agricultural areas and the potential leasing of traction animals would result in the creation of wealth for the owner (Pullen 1992: 53).

On the issue of secondary products, there appears to be no confirmed faunal evidence for large-scale production of milk or wool for exchange during the EBA to support Sherratt's model. Instead the mortality data indicate that animals were managed mainly for their meat (Halstead 1989: 73; 1994: 201; 1996a: 31-32; 2000: 115). Although Sherratt suggested that the introduction of drinking vessels in the Bronze Age may also mark the consumption of milk, it seems more likely that they would have been used for wine (Renfrew 1972: 282). The presence of 'cheese-pots' in the FN period (open vessels with perforated rims) may constitute the first evidence for the production of cheese, though this identification is extremely tentative and does not necessarily imply that cheese was first produced during this period (Broodbank 2000: 83). The ability to store milk for longer periods in the form of cheese would have been ideal for EBA communities. Negative evidence of wool production for other areas of Europe during the late 4th millennium comes in the form of the Alpine Iceman, who lacks any wool clothing whatsoever in an environment where it would clearly be appropriate were it being produced (though this would have been just before the beginning of the secondary products revolution; Sherratt 1997a: 205). Evidence for spinning and weaving is attested throughout the Aegean dating from the Neolithic onwards, in the form of spindles (occasionally), whorls and/or loom weights from Thessaly, the Argolid, Crete and the Cyclades (Barber 1991: 54, 99). Troy II levels (mid-3rd millennium BC) also revealed thousands of whorls, a couple of spindles, as well as loom weights that were thought to be *in situ* in relation to a now perished loom (Barber 1991: 54, 93). Other circumstantial evidence for spinning includes EM II looped bowls from Crete (e.g. at Myrtos Fournou Korifi; Warren 1972). However, as both Barber and Sherratt have pointed out, loom-weights or spindle whorls can also be used for linen production, and there is also evidence for the use of flax in the Aegean from the Neolithic onwards (Barber 1991: 35; Sherratt 1997b: 233).

The evidence for pack animals is also sparse. Suggestions that equid remains were identified at EN Ayios Petros in the Northern Sporades and LN Kephala in the Cyclades (Manning 1994: 228) have been disputed (Brodie 2004). The earliest evidence for the presence of the donkey or a similar small equid on the Greek Mainland appears to be from Lerna layers III and IV (EH II and EH III – two Lerna III bone fragments (different phases: B and C), one Lerna III/IV and eight or nine Lerna IV) and on the Anatolian coast at Troy IV (late EBA), although it has been suggested that cattle could have been used instead where transport of heavy items was necessary (Broodbank 2000: 92; Crouwel 1981: 32, 35; Gejvall 1969: 34-35, 54; Wiencke 2000: 44, 120). Evidence for the presence of small horses does not appear before the MBA at Lerna (Crouwel 1981: 33), though three bones from a horse (or mule) dating to EB III have been identified at Tiryns (von den Driesch & Boessneck 1990: 93). Whitelaw *et al.* (1997: 273) have alluded to the use of pack animals in EB II (EM IIB) Crete on the basis of large imported storage pithoi at Myrtos Fournou Korifi.

Pastoralism has attracted considerable attention as a viable FN-EBA subsistence strategy in various parts of the Aegean. Sampson suggested seasonal occupation of Skoteini cave on Euboia by herders and its use for mass storage, based in part on the presence of faunal evidence and more than 700 storage vessels inside the cave, the cave's humidity (which would have been unsuitable for long-term habitation) and the apparent unsuitability of the surrounding area for crop cultivation (Sampson 1992; 1993). This has been opposed by Halstead, whose review of the Sampson 1993 volume draws attention to the following facts: the area nearer the entrance, where occupation would have been more likely, was not investigated, the actual capacity of the storage vessels is not discussed, and this interpretation ignores the evidence produced by the faunal remains themselves. He also points out that such an interpretation does not account for the presence of fine-wares and ornaments or the exclusive burial remains of young adults and children inside the cave (Halstead 1996b: 179-180). Furthermore, he notes that although crops are not cultivated near the cave today, this was not the case several decades ago (Halstead 2000: 118). Zachos (1999) reached similar conclusions in support of pastoralism for the Neolithic occupation of Zas cave on Naxos, as did Cavanagh (1999; also Cavanagh & Crouwel 2002: 127) for the small marginal LN-EBA sites found by surveys across the Peloponnese. In both cases, the authors have suggested seasonal occupation by specialized pastoralists who were socio-economically dependent on nearby agricultural communities. Jameson *et al.* recognised the arguments against extensive transhumance in the Neolithic and EBA, but when considering the southern Argolid they found such hypotheses 'intriguing' and suggested the possible use of some upland sites for shelters in small-scale pastoralism, at least for the Neolithic (Jameson *et al.* 1994: 298, 346). Johnson suggested accordingly that spring-fed cultivation, employed by large villages situated near reliable water-sources in the EN and MN periods, was replaced in two stages by rain-fed plough agriculture and pastoralism, employed by dispersed settlements expanding into the more marginal areas in the FN-EBA phases (Johnson 1996; also suggested by van Andel & Runnels 1987 for the southern Argolid). On Methana, Mee & Taylor noted the location of some EBA sites in 'upland pastures' and the possibility of sheep and goat grazing, without suggesting large-scale pastoralism (Mee & Taylor 1997: 50).

Halstead (1996a) has questioned the likelihood of prehistoric pastoralism in the form of transhumance and the movement of livestock between the lowlands and highlands, two complementary environments which can be found in the southern Aegean and which were indeed exploited in the 3rd millennium BC. He has argued that the palynological and zooarchaeological evidence does not support the employment of large-scale pastoralism, which requires specialisation on particular animals, increased mobility and labour, and extensive land clearance (Halstead 1996a; 2000: 113-115). A single herder or nuclear household could not have managed the required amount of ovicaprids to achieve risk-free self-sufficiency in a southern Aegean landscape mostly broken up by woodland and cultivated fields, but would have had to compromise by mixing livestock and restricting seasonal mobility or periodic long-distance mobility, which could potentially have resulted in starvation or reversion to mixed farming (Halstead 1996a: 33-35). These observations are supported by Cherry's argument (1988: 16) that large market economies are probably a prerequisite for large-scale pastoralism. However, even if on a small scale, the exploitation of sheep and goat for secondary products could potentially encourage self-sufficiency for small and dispersed households in the landscape (Broodbank 2000: 82-83), though such a process would not be detectable in the archaeological record (Halstead 1998).

2.2.3 Small-scale mixed farming

Small-scale mixed farming has been proposed as an alternative by Halstead (1989; 1994; 1996a; 2000), i.e. the employment of a range of livestock in small numbers in an attempt to reduce possible risk of complete loss through potential disease, along with the cultivation of a number of different crops of differing growing cycles. Specifically, he sees Neolithic and EBA village communities employing intensive horticulture close to home (cereal/pulse rotation) along with small-scale herding, making full use of household labour and also of available land. The gradually increasing dependence on livestock and short-distance mobility of small herds may be seen as a result of settlement expansion into more marginal areas in the LN and FN, which would inevitably have been accompanied by a greater vulnerability to drought and crop production yield variability (Halstead 2000). Such dependence on a range of species on a small scale is supported by the modest number of cattle and pigs attested in the archaeological record (Halstead 1996a: 31).

Halstead maintains that communities reliant on agricultural subsistence would develop a number of strategies to cope with crop failure from seasonal and crop yield variability (Halstead 1989; 1994). Within such a framework, he suggests three major buffering mechanisms for this purpose, which he also identifies in the archaeological record: diversification (mixed farming), creation of surplus, and indirect storage through livestock (Halstead 1990; 1994: 202; 1996a: 23). The cultivation of a number of different crops would deal with the unpredictable nature of crop yield variation, although the success of such measures would depend on the temporal and spatial scale of the potential hazards. By contrast, the effects of seasonal variability tend to be more predictable – winter and spring constitute the main periods for vegetational growth in the lowlands (Grove & Rackham 2001: 10-11; Halstead 1994: 196; Horden & Purcell 2000: 12) – and therefore the storage of produce in particular forms could provide for the poorer seasons (e.g. storing glume wheats, emmer and einkorn as spikelets so that they are more durable, a practice that has been observed widely in the prehistoric Aegean; Halstead 1989: 71-72).

It has been argued that early societies were not formally aware of minimum subsistence requirements and therefore surplus as a concept could not have existed, unless it was deliberately set aside for a reason (Pearson 1957). Sahlins (1974) has also argued that there is no definitive line between production for subsistence and production for the creation of surplus, and that therefore there would have been no strategy for its creation. However, the creation and storage of surplus is vital for the survival of small agricultural communities against the continual problem of potential food shortage (Halstead 1989: 70). Furthermore, these would have developed within subsistence level production as a result of farmers targeting higher production rates than those required in a successful year in order to cover subsistence needs even in poorer years (Forbes 1989: 91-93; Halstead 1990: 152). Direct or indirect storage would have been organised to cope as efficiently as possible with the worst hazards, a strategy that should have led to the creation of surplus for most years (Rowley-Conwy & Zvelebil 1989: 45).

Surplus production can be exchanged in a variety of ways (e.g. simply through sharing food, providing food in social gatherings, or trading food for prestige items or services; Halstead 1989: 73) and has been regarded as a critical strategy, leading to obligations to reciprocate (Halstead 1989: 74; Halstead & O'Shea 1982: 93; Rowley-Conwy & Zvelebil 1989: 40). The potential for recurring crop failure for some farmers, particularly in marginal areas, and their inability to reciprocate would have resulted in the acquisition of prestige items and status for the more fortunate farmers (Halstead & O'Shea 1982: 93; Rowley-Conwy & Zvelebil 1989: 50). Such phenomena would have resulted in the collapse of the marginal areas and/or ultimately in the development of inequalities and social hierarchies, leading to the emergence of an elite that gradually gained control over surplus on a much wider basis (Halstead 1994: 207-208). It has further been suggested that elites would have emerged not because of their competence in managing the organisation of surplus but because of their ability to exploit and manipulate, whereas agricultural intensification would have encouraged sedentism first, which in turn would have prevented households from escaping the emerging elites (Gamble 1982; Gilman 1981: 7-8; also Halstead 1994: 210).

Halstead's criticism of Sherratt's secondary products model and his own suggestion for small-scale intensive mixed farming takes into careful consideration the ethnographic evidence from rural Greece today (Halstead 1996a). Earlier exhaustive ethnographic research of the Methana peninsula by Forbes (1976) further corroborates Halstead's views for the plausibility of such practices: modern populations have dealt with the localised variability in climate, soil moisture and acidity by exploiting tiny plots of land scattered across the landscape in a variety of eco-niches to buffer against crop failure. A subsistence economy based on small-scale intensive mixed farming would depend heavily on this kind of variety in eco-systems, but although they are often encountered in the Aegean, they cannot be assumed across the region as a whole without careful examination of each area under study. As a potential land use strategy, the employment of small-scale mixed farming in conjunction with buffering mechanisms would make full use of household labour and land, and minimise the risk of complete subsistence failure (Halstead 2000: 113), forming an ideal strategy for dispersed communities in the landscape.

2.3 Managing subsistence risk in the Aegean FN-EBA

2.3.1 Subsistence risk and strategies

In their attempt to explain socio-economic development during the EBA, all of the models discussed above take as their starting point the human-environment relationship and the notion that subsistence availability is intrinsically linked with socio-cultural behaviour. Despite their differences, they all begin with the recognition of the essential human need to procure food; the subsistence practices with which the Aegean populations attempted to achieve this would inevitably have led to the development of greater socio-economic complexity.

A key element of such models has become the impact of 'bad year economics': the development of buffering mechanisms and the ways in which they minimise subsistence risk and crop failure is a recurring theme in all subsistence-oriented approaches (e.g. Gallant 1991; Halstead 1989; Halstead & O'Shea 1989b; Rowley-Conwy & Zvelebil 1989). Rainfall in the Aegean continues to be unpredictable from year to year even today, especially in the eastern and southern lowlands, which are drier than other areas. Furthermore, water sources are mostly seasonal, scarce in the summer and potentially destructive in the winter in the form of flash floods. In these types of environments buffering mechanisms play such an important role, that they sometimes become embedded in the social structure of a community to the extent that they are no longer detected consciously as anything more than a cultural tradition (Forbes 1989: 187; Halstead & O'Shea 1989b: 2).

Different buffering mechanisms respond to different situations of variability and risk. The specific mechanisms used in each case will depend, amongst other things, on local and regional population patterns, intensity of subsistence needs and existing technology (Halstead & O'Shea 1989b: 4). Some, but not all, strategies can be combined if necessary, can be manipulated at different social levels (individuals, households, villages, states) and are embedded in the social structure to various extents. Many mechanisms take the form of kinship-based exchange and obligation networks. Overall, it has been argued that household and settlement level mechanisms need to interact dynamically in order for communities to achieve self-sufficiency (Halstead & O'Shea 1989b: 5).

2.3.2 The role of households as self-sufficient socio-economic units and as members of wider settlement networks

The importance of the household as a self-sufficient socio-economic unit has been emphasised in many of the studies introduced above (e.g. Gallant 1991; Halstead 1987; 1996a; 2000; Renfrew 1972; 1982; Sahlins 1974). It is likely that in the FN-EBA period decisions on agricultural production and labour input would have been controlled by the household (though this may not be the case for highly centralised societies of the later Aegean palatial periods), which often represents the most 'flexible and responsive unit to socio-economic change' (Ellis 1988; Gallant 1991: 13). It is true that dynamics within the household itself will change as the relative numbers of subsistence producers and consumers fluctuate through time. The rate of such fluctuations within prehistoric households is not open to direct assessment, as they depend on social trends (e.g. acceptable age for marriage) and physiological trends (e.g. average age of death), as well as unpredictable circumstances (e.g. unexpected death of a household member; Brück & Goodman 1999: 6; Fortes 1958; Gallant 1991; Goodman 1999; Wilk 1991). Of course it not just the life cycle of a household that can be variable; the residential patterns and the structure of the household itself can also vary in different social contexts and they are not easily discernible in the prehistoric archaeological (Brück & Goodman 1999: 5-6; Segalen 1984).

It is likely that a household will play a different role and have different priorities if it takes the spatial form of a single farmstead in the landscape than if it is part of a hamlet or village. In the case of Kythera, for example, the investigation of settlement in the FN-EBA may indicate that in many cases we are dealing with settlements of one or two households, whereas the cases of substantially-sized settlements are far fewer (cf. Chapter 4). The choice of site location may be more directly controlled by the household itself when it is geographically discrete, as would be the choice to relocate if necessary. However, this should be explored bearing in mind that the extent to which a discrete household forms part of a stable and enduring regional network may also affect such decision-making. After all, while a level of economic independence may be achieved by dispersal, in order for a small settlement to survive complete social independence and isolation cannot be an option. Ironically, in the long-term, the benefits of dispersed communities in the landscape are ultimately enjoyed by the wider settlement network, sometimes to the detriment of the smaller and more discretely located individual settlements (Broodbank 2000: 87). As Sahlins (1974: 69-74) has maintained, a household can only remain self-sufficient over the short-term, whereas over longer timeframes its survival would depend on its ability to create viable social networks beyond the settlement, in the form of inter-settlement marriages (e.g. Whitelaw 1983: 326), food/labour exchange, or the mobilisation of obligations (Halstead 1987; 1995a; 1999 for Neolithic households). Renfrew's suggestion that EBA seals reflect household 'independence' has been criticised (e.g. Blasingham 1981: 12), but subsequent work by Sbonias amongst others has also suggested that such an assumption might be true, at least for EB II on Crete, where seals were possibly used at household level and not for advanced economic exchanges. He further suggests that, if this is true, then EB II Crete communities must have been familiar with concepts of ownership and some form of economic exchange (Sbonias 1999b: 44). According to Sbonias, the first indications of settlement differentiation (through seals) appear in the transition period EB II/EB III (Sbonias 1999b: 36). Seals and sealings from the southern Mainland in particular have formed the basis for much discussion concerning their function and socio-economic context. Similar suggestions linking seals and sealings to households or settlements have been put forward by Wiencke (1989), whereas Pullen further argues that the sealings at Lerna are indicative of a redistributive system and of emerging social complexity on the southern Mainland (Pullen 1994). However complex these Mainland sealing systems may or may not be, there are strong indications that households, at least within some areas of the southern Mainland, could have formed part of solid settlement networks with significant levels of socio-economic interaction.

The EB II phase in particular saw the development of large settlements that became more integrated into wider settlement networks at an interregional scale (e.g. Lerna, Kolonna on Aegina and Tiryns; Hägg & Konsola 1986; Pullen 1985; 1986b; Rutter 1993). The presence of such settlements in the midst of primarily rural landscapes highlights definite levels of settlement differentiation and probably hierarchy in the southern Aegean for at least part of the EBA. The complexity of such networks has been the centre of much debate (Cavanagh & Crouwel 2002; Hägg & Konsola 1986; Mee & Taylor 1997; Pullen 1985; 1994; Runnels & van Andel 1987; Wiencke 1989). Clear size hierarchies of settlement have been suggested in the southern Argolid, the Argive plain, Methana and elsewhere on the basis of architectural differentiation (e.g. 'corridor' houses vs. smaller structures), variation in the material culture (sealings, pottery types) or because of settlement size (based on evidence from intensive and non-intensive surveys, as well as excavations). What is particularly relevant to this research is the variability observed in the number of tiers suggested for settlement ranking in different areas, for example, 'two-tier' in Lakonia (Cavanagh & Crouwel 2002), *possibly* 'two-tier' on Methana (Mee & Taylor 1997), 'three-tier' in the southern Argolid (Jameson *et al.* 1994; van Andel & Runnels 1987) and possibly in the Berbati-Limnes area (Forsén 1992), or very little hierarchy at all for EB II Crete, specifically in the Messara (Sbonias 1999b: 31, 46; although this has been disputed, e.g. Watrous *et al.* 2005: 237). With regard to Crete specifically, there is a more general debate with regard to the level of social ranking for this period (Branigan 1983; 1995: 37; Cherry 1983a; 1984b; Soles 1988; 1992; Warren 1987; Watrous 1994; Watrous *et al.* 2005; Whitelaw 1983). The issues which pertain to the accurate establishment of site size for sites identified in survey areas and the factors which currently inhibit quantitative comparisons of settlement hierarchies across surveys are discussed in Chapter 3.

2.3.3 Demography in the FN-EBA Aegean

Population growth has been regarded as a major instigator, indicator and/or result of the socio-economic developments observed during the FN-EBA, particularly in terms of apparent movement into the more marginal areas (e.g. Gamble 1982; Halstead 1989; 1994; Renfrew 1972; 1982; Sherratt 1981). However, deciding on demographic figures for the period remains fraught with problems, despite continuing efforts to achieve reliable estimates (cf. also papers in Bintliff & Sbonias 1999; Cherry 1979; Osborne 2004). The evidence from settlements and cemeteries throughout the Aegean has provided some indications, though the picture is still very hazy (e.g. Bintliff 1977; Broodbank 1989; Doumas 1977; Evans 1994; Warren 1972; Whitelaw 1983; 1991a). The presence of either a settlement or a cemetery, and not always both, renders the investigation of population numbers even more problematic by not facilitating their estimation on the basis of more comprehensive data.

The importance of survey data for estimating site numbers and size, and therefore actual human populations, was highlighted by Renfrew (1977) and reiterated by Cherry (1979) in the late 1970s. This is still widely accepted today and survey data have been regarded as an essential avenue for defining demographic estimates in the Aegean (e.g. Cherry *et al.* 1991a; Jameson *et al.* 1994; Mee & Forbes 1997a; Renfrew & Wagstaff 1982). Preliminary estimations by Renfrew (1972: 251) of 34,000 people for the EBA Cyclades and 75,000 for the island of Crete have been now deemed grossly exaggerated; Cherry has pointed to three basic reasons why Renfrew's population estimates were too high: he assumed that all sites were occupied throughout the EBA, he defined an unrealistically high estimate of 300 persons per settlement, and he included non-settlement EBA sites in the calculations (Cherry 1979: 43). Population densities have also been lowered to 0.5-1.5 and 1.5-3.0 people per sq.km for EB I and EB II respectively (Broodbank 2000: 88).

Establishing the function and life span of a site is important in obtaining a regional demographic estimate (e.g. non-settlement sites, such as those for tool production that should not be included in such calculations). The work of Whitelaw at Myrtos Fournou Korifi and Bintliff in the Messara has provided a solid basis from which to start exploring Aegean EBA demography more closely (Bintliff 1977; Whitelaw 1983). Bintliff explored the cemetery data from the Agiofarango gorge and estimated an average of 7 people per family unit per generation (ca. 25 years), and such estimates appear to be confirmed by the settlement data (Bintliff 1977; Cherry 1979: 40). At Myrtos Fournou Korifi, based on a 10sq.m per person estimate as well as the quantification of storage pots in each household, Whitelaw (1983: 332) suggests households of 4-6 individuals, which he suggests to be the size of an average nuclear family (suggesting a dense pattern of 310 or more people per hectare). He identifies no hierarchy among the households at Myrtos Fournou Korifi and suggests that the members of the different households were probably related (Whitelaw 1983: 333). It cannot be assumed that households were always nuclear across the southern Aegean. Even if this was prevalent, there may have been variations depending on kin and social ties; for example, historical sources have shown that in Classical times the simple family unit may have formed the basic household unit, but it was often altered during its life cycle with the addition of relations whose own domestic cycle had been disrupted by death or separation (Gallant 1991: 25). In the demographic discussions throughout this thesis, the nuclear family is considered as the basic household unit, however, it is acknowledged that other forms may have been present even if it is not possible to identify them in the archaeological record.

Whitelaw has suggested that the average settlement space per household in the EBA would have been 150-200sq.m. This is primarily based on his detailed investigation of the EBA site at Myrtos Fournou Korifi on Crete (Whitelaw 1983), though he also suggests that EC settlements are equally compact (Whitelaw 1991: 200). However, these estimates are based on excavated sites and it is only reasonable to assume that the size of a survey scatter will be considerably larger than the actual dwelling/building extents. Investigation of recent rural settlement on Kea has led him to suggest that a single farmstead scatter tends to range between 0.25 and 0.5 ha depending on the dispersal of farming installations in each case, the larger ones comprising 'more prosperous productive' settlements or 'agrarian estates', and that settlements exceeding 1 ha cannot be a single farmstead but are possibly adjacent farmsteads or small villages (Whitelaw 1994: 172). Whitelaw's investigation of the FN settlement of Kephala on Keos, on the other hand, has led him to suggest that the 0.7 ha area of settlement represented 7-10 households, which equals 700-1000sq. m. per household, an estimate that he claims is within the range observed for Aegean EBA sites overall, but towards the lower end (Whitelaw 1991: 207-208). The area covered by a household in agricultural communities will depend on how integrated a settlement is in terms of dwellings and farming installations, and this is bound to vary to some extent across the Aegean (and possibly between phases), as settlements adapt to the idiosyncrasies of their particular regions (or micro-regions).

Changing regional demography and the ways in which it is linked to socio-economic developments in the FN-EBA is an important element of this research;

however, the varying methodologies used by surface surveys constitute major barriers in establishing population estimates (Osborne 2004; Sbonias 1999a). These variations affect both the accurate establishment of site size and the number of sites recovered in the field. This will be discussed in detail in Chapter 3.

2.3.4 Subsistence-oriented settlement location

Whether the selection of settlement location is a decision taken directly by the settlement's inhabitants or influenced by the wider network of settlements in a given area, the factors influencing such a decision are complicated. If the choice of settlement location is based primarily on the agricultural potential of the land, then this in itself is a form of risk minimisation, i.e. eliminating the chances of poor food procurement. A small-scale society based primarily on agricultural subsistence and aiming for self-sufficiency will tend to be located in places with suitable land for cultivation and maintaining animals. The settlements will probably be as close as possible to resources because the further away they are, the more energy will be required to access them, leading ultimately to reduced production. The introduction of other resources into the system, such as obsidian in the case of Melos, makes the choice of location more complex (Wagstaff & Cherry 1982: 246, 257). Phylakopi is a good example of site location *not* always being dependent on the agricultural potential of its land; the site is located neither close to the best agricultural area nor particularly close to the obsidian source (Barber 1987). The Cycladic islands are regarded as agriculturally marginal landscapes, particularly the smaller ones, but nevertheless with important resources, such as obsidian and metals (Broodbank 2000: 78). However, at a time of wider Aegean integration, when these island sources were important throughout the wider region, it is possible that what influenced the location of settlements was not so much the particular locality of resources but rather access to good harbours, or at least the sea. Besides, ethnographic evidence from the Aegean indicates that farmers are sometimes prepared to travel a considerable distance to reach their fields: the average walking distance to the fields for Greece as a whole is ca. 2.5 km (30min), whereas on Melos farmers walk for an average of two hours a day (Acheson 1997: 173). Certain production activities may also have been located away from the settlements, as in the case of the EB pottery kiln located at a distance from the site of Agia Irini (Barber 1987: 51).

The availability of fresh water has also been regarded as an important variable affecting settlement location. In the Cyclades, for example, there are significant variations in the availability of groundwater between the islands, and populations may have had to collect rainwater to fulfil their needs, though there is little evidence to support this (Barber 1987: 44; Broodbank 2000: 77-78). The availability of fresh water on Methana is also very limited (Mee & Forbes 1997a), whereas other areas, such as Lakonia or Kythera are richer in perennial (karstic) springs, although these can be very ephemeral (Cavanagh *et al.* 2002; Pagounis 1981; Pagounis & Gertsos 1984). Based on the plant remains at Franchthi cave, Jameson *et al.* (1994: 263) suggest that spring-fed crop cultivation may originally have been carried out near the springs below the cave settlement. They also point out that rain-fed cultivation would have been less productive but would have allowed for the cultivation of a much greater area, and would have taken place from at least the EBA onwards, possibly partly instigating the burst of new settlements across the EBA landscape (Jameson *et al.* 1994: 350). Overall, they suggest that the settlement patterns of the southern Argolid indicate a mixed cultivation of field crops and olives, supplemented with herding. A similar shift has also been suggested by Johnson for the Berbati-Limnes area (Johnson 1996).

The reasons for choosing to settle in the more marginal areas of the Aegean landscape in the FN-EBA are hard to define, especially as this movement seems to be taking place at a time when these areas are becoming even more climatically marginal (Grove & Rackham 2001: 145). However, it appears that the marginality may vary from area to area, and may relate to spatial isolation, poor soils or low rainfall levels. For example, Methana is climatically marginal overall, particularly in terms of rainfall; however, the small pockets of fairly flat land found amidst the steep slopes could easily provide subsistence for a single household (this will be further investigated through GIS analysis of slope around settlements and of the distances between them). It is important to distinguish between different forms of marginality, as it is not always clear what one means when using the term 'marginal'. In this research marginality is seen to take three different forms: environmental (for example in terms of climate, particularly precipitation, terrain, soils or other resources), spatial (with regard to other populated areas) and cultural (in terms of the integration of communities into wider settlement networks).

Although the subsistence strategies put forward in the various models may not always suit every Aegean landscape or the cultural phenomena observed, this is interesting in itself and indeed leads one to assess potential variety in land use depending on the specific character of the various landscapes encountered. For example, the adoption of the plough only in areas with appropriate soils or when the social conditions are right is worth considering as an alternative to a rather simplified model of uniform technological adoption. In the same way, the possibility for localised, small-scale livestock mobility, as suggested by Cherry (1988: 16) and Halstead (2000), may also have been possible. On the other hand, as Halstead rightly observes, milking and dairy production could have formed part of small-scale mixed farming despite a primary focus on management of livestock for meat, though this would not be detectable in the zooarchaeological record (Halstead 1996a; 1998; 2000: 115). This need not have formed an intensified industry but simply a supplementary form of subsistence, enabling the survival of settlements, particularly in the more marginal areas. The use of terracing could further improve the potential of marginal areas, but evidence of terracing is attested only after the EBA (Frederick & Krahtopoulou 2000: 78-79; French & Whitelaw 1999: 173; the effects of terracing on the archaeological record are discussed in Chapter 3). Ethnographic perspectives on land use, informed by discussions of the recent Greek landscape, can be useful but do not provide a straightforward analogy for past land use. For example, the last 200 years in Greece have seen the disappearance of cereal cultivation from mountainous areas (Grove & Rackham 2001: 89), whereas olives grow solely on lower slopes and in coastal areas (mainly due to their intolerance to frost). It is possible that this disappearance of cereals from higher altitudes in modern times is what has led to beliefs that FN and EBA sites in the highlands must have been pastoral. However, it is important to remember that, overall, most Mediterranean crops are tolerant to a wide range of soils and climates (Halstead 1994: 209-210) and that linking particular crops to particular environments can be misleading, as the growing of crops is influenced by other factors, not only environmental (Acheson 1997: 178; Grove & Rackham 2001: 89). This can be seen in the case of modern Methana, where although the olive tree seems to grow better at altitudes below 300m (Forbes 1976: 240), the inhabitants of the peninsula cultivate it at higher altitudes as well. The potential for local variations in land use and their association with a range of land types and settlements need to be explored, as this may provide insight into the factors shaping settlement patterns and choice of location.

2.4 Defining analytical regions in the FN-EBA Aegean

2.4.1 The concept of the region in the Aegean

The three models addressed in section 2.2 (polyculture, secondary products revolution and small-scale mixed farming) relate to the southern Aegean FN-EBA, but all aspects of this chapter so far indicate regional variations across the southern Aegean, in terms of cultural traditions, climate and environment, subsistence strategies and demography. However, our understanding of these variations, their scale and gravity and the way in which they interact, is not as clear cut as one might hope, and has sometimes led to misguided over-emphasis of certain aspects and inattention to others. For the purpose of this investigation the term 'region' could be defined as a space that is perceived as or determined by us to be distinct from other spaces in the same landscape and at a set scale of investigation (in our case the Aegean as a whole). What actually affects these perceptions or determinations forms part of the following discussion.

Establishing the nature of a region in the Aegean is essential because a) regions, and the way they are perceived or brought into being by people, will affect how these populations move and interact within the landscape, and b) the Aegean has traditionally been broken up into the cultural spheres of the Peloponnese, the Cyclades, Crete and the Anatolian coast, a modern-day division, reinforced by Renfrew's use of them (1972), that leads to gross generalisations about cultural regionalism and renders difficult the understanding of the more complex processes that are actually taking place. Although it is true that these four regions are geographically distinct, this division ignores the cultural influences crossing their borders, as well as the differences within them. Closer investigation has shown that there is a lot more variation than was previously recognised. The main element dividing these areas is the Aegean Sea, but as Horden and Purcell (2000: 24) point out for the Mediterranean overall: 'the paradox of the Mediterranean is that the all too apparent fragmentation can potentially unite the sea and its coastlands in a way far exceeding anything predictable of a continent'. This can also apply more specifically to the EBA Aegean: on the one hand, the architecture and material culture shows regional diversity within Crete (Whitelaw *et al.* 1997; Whitelaw 2004), and the lack of homogeneity of Cycladic material culture has led Broodbank to question the notion of a self-aware Cycladic society with sharp cultural boundaries (Broodbank 2000); on the other hand, pottery from the island of Kythera is suggesting interaction with both west and central Crete and the south Peloponnese (Broodbank pers.comm.; Kiriatzi 2003). A relevant example where these divisions have come into question is the suggestion by Nakou (1997) of two cultural spheres in EB II/III, one involving Euboia, Attica and the Cyclades, the other involving the Peloponnese. The Anatolian-style pottery (such as the depas cup or the tankard) and other material present at late 3rd millennium sites at Pevkakia in Thessaly, Lefkandi and Manika on Euboia and Aegina in the Saronic Gulf are seen by Nakou to reflect a metal trade network that extends across the Corinthian Isthmus as far as Lefkas in the Ionian Sea without involving the Peloponnese. Instead, it seems to link up with Propontis sites, such as Troy and Poliochni, and more indirectly with western Anatolia and the Mesopotamian states. Such spheres of interaction clearly dissect the traditional barriers set by Renfrew and others and highlight the multifaceted and complex nature of Aegean regionalism.

A single region is potentially defined by particular environmental characteristics or proportional combinations of characteristics that are not the same in other regions. The Aegean is diverse in terms of climate and natural environment, which vary on a spatial and on a temporal scale. This is to a great extent due to the way that the terrain is broken up, from N to S and from W to E. It consists of a concentration of basins, and inland or coastal valleys and plains of varying sizes, which are defined by series of mountains and/or the sea. For example, the dramatic landscape of the warmer and drier volcanic Methana peninsula contrasts quite strongly with the more gentle landscapes of the southern Argolid plains and the Kythera plateaux, which are also richer in water sources (James *et al.* 1997: 5-7; Jameson *et al.* 1994: 169-171; Pagounis 1981; Pagounis & Gertsos 1984). However, it is also the case that although some of the larger regions in the Aegean may be similar in that they consist of more or less the same range of different environments ('the differences which resemble each other'), the micro-regional environments within each region can be remarkably diverse (Horden & Purcell 2000). The effect of such intra-regional variations can also be seen climatically, as in the case of Crete, for example, where deluges can take place in very limited areas whilst others stay completely dry (though all will get one sooner or later; Rackham & Moody 1996: 21). Forbes (1976) further exemplifies this through his ethnographic research on Methana, which identifies extremely localised environmental and climatic patterns throughout the peninsula, whereas Jameson *et al.* (1994: 267) also identify variation in soil qualities in the southern Argolid, with the Fournoi Valley having the best soils in the area. Such diversity in the Aegean is particularly relevant when investigating different surveys, as they have often been carried out in very different types of environmental landscape.

2.4.2 Defining regions with respect to cultural ecology

The concept of regions needs to be combined with the investigation of landscape formation and cultural ecology. It has been argued that to a great extent the Mediterranean landscape has been formed through the interaction of humans (both recent and not so recent) with the natural environment, and this interaction will depend (though not inevitably) on culturally specific land use and economic strategies (Grove & Rackham 2001: 14). It should be acknowledged here, however, that this is merely one aspect of a landscape, which will also play an important role within socio-symbolic frameworks (Knapp & Ashmore 1999). 'Cultural ecology' is used to describe these interactions between human cultures and the natural environment (Horden & Purcell 2000: 45; Simmons 1997: 23; Steward 1977: 30) and is more appropriate in this kind of investigation than the term ecology in itself, which evokes a more determinist and one-sided adaptation of humanity to the environment (Simmons 1997: 220).

One key issue is the extent and spatial variation of environmental difference. Such variation can occur at scales from the micro-local to the global. An example of variation in the Peloponnese can be observed between Pylos and Methana, the former showing particular vulnerability to erosion (Zangger 1998: 6-8), the latter appearing to be relatively resistant (James *et al.* 1997: 25). Two of the most importance processes to have taken place are erosion and alluviation. These have resulted in the deposition of sediments inland and along the coast, contributing to changes in terrain morphology and hydrology, including sometimes dramatic shoreline change (Lambeck 1996: 598). On the other hand, the 0.7-1.0 mm p.a. sea-level rise in the Aegean for the Neolithic and Bronze Ages (Lambeck 1996: 606; van Andel 1989) would not have been noticeable during a person's lifetime (the early EBA sea level would have been 10m lower than it is today). Changes such as this are unlikely to be noticed by the average community and therefore are unlikely to be taken into account in every-day coping strategies (though they are likely to have an affect over longer periods of time). A reduction of water sources on Crete has been noted by Moody (2000: 53), who maintains that of the 25 major rivers identified on Crete during the Medieval Little Ice Age, only seven exist today, a phenomenon which she attributes to possible irrigation or evaporation (though she also points out that it could be the result of varying criteria for the identification of rivers); change in climate since then will also have had an impact. Halstead (1994: 196) points to evidence for 'a relatively wooded landscape' in lowland areas which today are treeless and upland areas which have now become extended grasslands, changes that he attributes to anthropogenic interference in the 3rd and 2nd millennia B.C. for the lowlands and in historical times for the mountains in the north. Grove & Rackham claim that the climate of the Early Holocene was wetter and more seasonal than now, with gradual change taking place during the Neolithic and Bronze Ages in the form of 'aridization' (Grove & Rackham 2001: 145). As a result, the semi-arid climate we know as 'typically Mediterranean', accompanied by the known vegetation that has adapted to it, would have been typical only for the last 5000 years (Grove & Rackham 2001: 150). It is interesting that the movement of settlements into the more marginal areas during the FN and EBA seems to be happening at a time of heightened aridity, which would have increased the overall risk of crop failure because of drought (Halstead 1994: 202-203).

The dramatic changes in the Aegean during the late Holocene have given rise to an ongoing debate as to whether the processes affecting environmental change are natural or anthropogenic (Acheson 1997; Forbes 2000; Grove & Rackham 2001; Halstead 1987; 1994; 1996a; 2000; Jameson *et al.* 1994; Krahtopoulou 2000; Rackham & Moody 1996; van Andel *et al.* 1986; van Andel & Runnels 1987; Vita-Finzi 1969; Zangger 1994). Vita-Finzi (1969) put forward the idea that two major phases of alluviation (the Older and Younger Fills) took place throughout the Mediterranean, the first in glacial times and the second during the Roman period, as a result of climatic fluctuations and not anthropogenic cause. This, however, has been rejected (e.g. Bintliff 1992; Jameson *et al.* 1994; Pope & van Andel 1984; van Andel & Runnels 1987; Wagstaff 1981) as being too simplistic for the kinds of temporal and spatial variation that one observes in the Aegean itself, let alone the Mediterranean as a whole (cf. papers in Leveau *et al.* 1999 for the complex interaction between human and climatic factors that influence environmental change in the Mediterranean). Dramatic climate change may also have occurred towards the end of the late 3rd millennium BC, when extreme drought conditions may have contributed to the patterns of social and political upheaval throughout the wider eastern Mediterranean (Weiss *et al.* 1993). Such a climatic phase would be of particular significance to developments in the southern Aegean, where similar dearth of settlement has been observed for EB III (2200-2000 BC); however, it remains unclear whether this is sufficient as an explanation.

The main human activity suggested as a cause of erosion and alluviation is land use for agriculture and pastoralism. This can include forest clearance and the abandonment of fields that have previously undergone intensive land use (Acheson 1997: 184; Halstead 1994: 196; van Andel *et al.* 1986; Zangger 1994). In the southern Argolid, for example, soil erosion and alluviation was blamed on the change of land use from more intensive to more extensive exploitation strategies in Hellenistic and Early Roman times, as well as on the abandonment and destruction by goats of the terraces on the slopes (Jameson *et al.* 1994: 298-299; van Andel & Runnels 1987: 150). Such a model has, however, been opposed by Acheson (1997: 183), who claims that the area cannot have been terraced heavily enough to lead to such erosion. The assumption that Greece, as well as the rest of the Mediterranean, used to be rich in forests and water sources forms an essential part of the *ruined landscape theory*, which describes massive landscape degradation and climate change (erosion, floods and fires) as a result of forest clearance (due to wood exploitation by humans, followed by goat grazing) (Grove & Rackham 2001: 8-10).

Grove & Rackham argue strongly against the ruined landscape theory in that it leads to gross generalisations about what are actually highly diverse landscapes. They do not deny that human impact can play a role in environmental change, but they reject the possibility that it is an *exclusively* anthropogenic process. In contrast, they believe climate change to be the driving force behind environmental change. Rackham & Moody further suggest water and earthquakes as major agents of erosion and state that: 'as far as we know [...] it has nowhere (at least in Greece) been possible to connect a particular episode of past erosion with the expansion of a specific kind of human activity that is definitely known to promote erosion in a similar locality today' (Rackham & Moody 1996: 23). Although the ruined landscape theory is therefore clearly not the way forward, as has been argued by others as well (Forbes 1996; 2000; Halstead 2000), the above statement is somewhat extreme. Halstead bases himself on palynological evidence to suggest gradual lowland clearance because of land tenure and winter grazing, and extensive mountain deforestation through transhumant pastoralism (cf. supra; Halstead 1987: 81; 1994: 196; 1996a: 27). The 'interaction of natural and anthropogenic processes' and the difficulty in separating them from each other (Halstead 2000: 110) clearly needs to be acknowledged, not least because they will have an impact on land use and its variation across the EBA Aegean. The effects of environmental change will vary and, arguably, interannual variability (particularly in terms of rainfall and terrestrial water sources) would have had far greater impact on the subsistence economy than longer-term variability (Halstead 1994: 196).

The question one would ask is to what extent one should use an ecological basis for the interpretation of the 3rd millennium in the Aegean and the past more generally? The problems of such an approach have been discussed by several scholars (e.g. Brück & Goodman 1999; Halstead 1987; Horden & Purcell 2000). In one sense, a purely ecological analysis is never enough for understanding the past, because specific subsistence strategies always belong to particular historical contexts (Halstead 1987: 83; 2000; Horden & Purcell 2000: 47). Therefore one has to go back to the historical sources to decide what models to apply. Prehistory faces these problems to an even greater extent due to the lack of complete or detailed written records. Archaeological evidence can suggest possible contexts, but it is seldom unambiguous. The integration of site data which incorporate definitive attributes, such as detailed chronology, size and function and aspects of site location with relation to other sites and the local environment and its potential, can help to overcome such problems.

The assessment of landscape and ecology is essential to the understanding of settlement patterns and their socio-economic background. However, a balance needs to be struck between environmental and cultural determinants. Socially and geographically defined regions do not necessarily coincide, and similar environments can produce very different cultural landscapes. Human choices are influenced by a variety of factors, some environmental, some social and some personal. There will be times when communities are faced with several equally valid options for successful interaction with their environment. There will also be times when the practices of a single farmer or a community may be beneficial short-term, but detrimental for the next generation (for example the over-exploitation of land that leads to subsequent erosion and the loss of its agricultural value several years later). It will therefore be essential to keep in mind that human agency and the ability to make choices – and not necessarily the 'right' ones – play a major role in the development and decline of human societies.

2.5 Aims of thesis within a framework of subsistence and regional variability

This chapter has investigated three main subsistence models that attempt to describe the key processes that took place in the FN-EBA Aegean. Within this context the chapter also addressed issues of risk management, subsistence strategies, the role of households and settlements, as well as the importance of defining useful regional units of analysis for the consideration of the socio-economic development of FN-EBA communities in the Aegean.

In the study of settlement dynamics and regional demographies and economies, two key elements to be addressed will be the spatial scale of variation and the role of subsistence risk. Attempts to minimise subsistence risk will influence a whole range of decisions, such as the choice of settlement location and size, the nature of particular sites, the preferences for land for agricultural exploitation and the forms of land use employed, the proximity to and use of raw materials, as well as the nature of socio-economic networks between settlements on a regional and interregional scale. The broader the established social networks, the greater the chance of exploiting them at a time of crisis, when the basic farming strategies fail.

Geographical and political regionalism in the Aegean is far more complex than acknowledged in Renfrew's traditional division. Although it can be perceived as an entity in its own right (if not always politically, certainly geographically), the Aegean can also be seen as a concentration of smaller, localised, but at the same time interactive regions, which will shift in their dimensions and interactions on a temporal scale. These regions may have their own micro-climates, but the extent to which they have their own micro-ecologies and whether these are similar across several regions remains to be investigated.

The connection between the concept of regions and landscape exploitation is of key importance for this research. Survey data are not able to provide direct answers concerning what subsistence strategies the FN-EBA sites were involved in. However, the investigation of site location and the character and qualities of the surrounding land could potentially indicate available land use(s) for these sites. Therefore, the re-examination of the FN-EBA through survey data, and with the help of GIS, aims to explore questions about a) the character and spatial distribution of FN-EBA sites and their development from the FN onwards, b) the FN-EBA landscape and variations across the selected survey areas, and c) regional processes in the FN-EBA Aegean (focusing on the northeast Peloponnese and Kythera) with regard to subsistence economy, demography and human choices.

The issue of regions is examined on two levels. On a first level, it is the variability within each survey area that is of interest. The aim is to explore how FN-EBA communities dealt with their immediate environment and how they exploited the mosaic of micro-regions available to them in order to sustain a viable existence. On a second level, the aim is to examine how this differs between regions with different sets of 'eco-niches' (Forbes 1976). The problems in comparing data from different surveys are all too well known and are discussed in detail in the next chapter. It will be important to assess in what way each survey area constitutes a coherent region, part of a region, or several (whole and/or partial) regions, i.e. to establish, in terms of size and overlap, the relationship of such regions with the actual survey areas. This can be partially explored through spatial variations observed in settlement patterns. It seems likely that the greater the terrain variation within a survey area, the greater the chance of finding more than one distinct unit worthy of separate analysis, at least in geographical terms. In terms of settlement size, even if it is not always possible to compare the results from different surveys quantitatively, it should be possible to compare them qualitatively. The variation in settlement size within each survey area can highlight human interaction within each specific survey area. It should therefore be possible to assess potential hierarchies within each survey area and compare these hierarchies across the surveys. The aim is not to create a generalised picture for the Aegean in the FN-EBA, but to understand how, in each case studied, FN-EBA communities interacted with their particular set of eco-niches. In this sense it should be possible to overcome the issues of survey comparability.

The investigation of how settlements and regions interact raises interesting questions with regard to the spatial scale of analysis and how demography and socio-economic structure are linked in the FN-EBA. This is important not only in terms of establishing the complexity of regional networks, but also in understanding the extent to which regional crisis might potentially catalyse change in the wider Aegean.

CHAPTER 3

Archaeological survey in the Aegean: The identification, measurement and interpretation of artefact distributions in the landscape

3.1 Survey in regional studies

Regional studies in the Aegean have become essential for exploring the interaction between human populations and their local environments, as well as the balance between, on the one hand, the gradual understanding by people of how these environments work and the development of appropriate technologies to exist within them and, on the other hand, the impact of the social and cultural patterns that intervene in these processes (sometimes positive and sometimes negative).

Archaeological survey has become an integral part of regional studies, as it allows for a comprehensive investigation of archaeological landscapes far beyond the settlement level achieved by excavation. Roughly in its current form, it has been employed throughout the Aegean over the last three decades (Alcock & Cherry 2004a). For example, it is already over twenty years since the publication on Mediterranean survey by Keller & Rupp (1983), from which almost half the surveys have been based in the Aegean. Since then, the last two decades in particular have seen an abundance of systematic and intensive multi-period regional surface surveys in the Aegean, which are very different from most of the earlier ones (with a few honourable exceptions). This has mainly been the result of an attempt to move away from crudely dated 'dots on maps', and instead to obtain valid samples and to investigate the complexities of settlements and surrounding landscapes within a socio-economic framework (Alcock 2000; Cherry 1994). This has been accompanied by a continued refinement of strategies and methodologies at a rate that has greatly surpassed that of excavation. This need not come as a surprise, as survey is a relatively new investigative tool in the Aegean, at least in the intensive form implemented today. Besides survey methodology, these refinements have included the introduction of more inter-disciplinary approaches and tools (including GIS), the investigation of a range of landscapes and an enhanced understanding of archaeological signatures in the landscape. Partly as a result, it is now widely acknowledged that sites are not exclusive forums for human activity and that the implications of 'off-site' data also require investigation (Alcock *et al.* 1994).

Consequently, this accelerated evolution of research designs and sampling strategies has produced a substantial variation in approach across different survey projects. Furthermore, despite the advances, there are still surveys in operation that deploy outdated methodologies, as well as those that have very specific research designs that focus on particular periods or types of archaeological materials. Inevitably, the variation in the quality and quantity of survey data has made the use of surveys for comparative purposes extremely difficult. The plethora of publications dealing with Aegean survey – Cherry (2004: 24) counted 8,467 articles on survey for the Mediterranean as a whole in 15 journals for the years 1967-1999 – highlights the difficulty facing those interested in comparative studies.

The regional scope of the study undertaken here requires the use of data derived from several such surveys and, as a result, a careful examination of potential sources has been carried out, taking into consideration the array of issues that arise in the handling of survey data (such as comparability of site detection, modes of recording and sampling and collection strategies), especially when attempting to compare different survey areas that have been explored using varying methodologies within a variety of research designs. This chapter deals with such issues, first by looking at how survey has developed within the Aegean and the effect this has had on data quality and the ability to compare different datasets, and then by describing the criteria that led to the selection of datasets specifically for use in this study and the ways to make comparison possible.

3.2 Survey as a discipline in the Aegean

3.2.1 From bicycles to clickers

Morris (1994b: 7) has described survey as 'a form of analysis which integrates material culture with larger social structures and with intentions and perceptions of individual actors'. Aegean survey has come a long way, from a simple exercise aimed at identifying archaeological sites suitable for excavation, to become a complex, detailed and multi-disciplined process of mapping archaeological landscapes and the range of human activities that occur within them. Nostalgia for the ancient world brought antiquarians to the Aegean as early as the 17th century AD (Constantine 1984: 3-4), and these were among the first individuals to record sites of interest that they located based on their own awareness of potential human habitats (prominent locations such as acropoleis, caves etc), or based on the knowledge and experience of local inhabitants (Morris 1994b: 6). During the 19th and early 20th centuries, the purpose of these explorations shifted to identifying sites suitable for excavation; but they continued to be extensive and non-systematic (for examples of early Aegean site surveys in the last century or so cf. Benton 1931-2; Dawkins 1902-3; Dodwell 1819; Hope Simpson & Lazenby 1970; 1973; Howell 1970; Mackenzie 1896-7; Pendlebury 1939; Waterhouse & Hope Simpson 1961). 'Site surveys' were responsible for the detection of a number of important archaeological sites, nonetheless in terms of the overall archaeological landscape, they produced at best patchy and biased gazetteers with a focus on large sites situated primarily in prominent locations or environments exploited by local populations at the time of exploration, and they ignored sites of smaller artefact extent or density (Cherry 1983b; Plog *et al.* 1978: 386).

Despite this earlier tradition, it was only really in the 1970s that survey was first introduced into the Aegean as a discipline in its own right. Several scholars have explained the introduction of survey as a turn to cheaper and faster archaeological investigation in response to the increasing costs of large and difficult excavations, particularly by the 1970s and mainly as a result of economic and political reform in Greece (Cherry 1983b: 381; Dyson 1982: 89-90 for the Mediterranean in general; Hope Simpson 1984: 116; Morris 1994a: 38). The value of survey for regional archaeology became clear very quickly, to the point where some scholars have claimed survey to be far superior to excavation (Snodgrass 1977), though this has been seen as an exaggeration by others (e.g. Hope Simpson 1984; Popham 1990). The introduction of a variety of complementary disciplines into the field and its increasingly complex nature have inevitably caused it to become slower and more expensive, thus depriving it of two of the original characteristics that made survey appealing to archaeologists in the first place. What is clear is that survey is far less destructive than excavation (Snodgrass & Cherry 1988) and potentially allows updated reinvestigation of archaeological landscapes due to the ability of surface scatters to regenerate through ploughing, erosion etc. Furthermore, survey facilitates the investigation of the rural landscape and in particular the numerous smaller agricultural sites that are generally ignored by excavators. We may not be able to acquire the detailed site information provided by excavation, but as Cherry (1983b: 387) has pointed out in very simple terms: 'survey can tell us a little about lots of sites'.

Nearly a hundred surveys have focused on the Aegean (on the Mainland, Crete and the islands) as part of a wider development of such activities in the Mediterranean overall (Alcock & Cherry 2004a: 2; Cherry 2004: 28). The Argolid Exploration Project (Jameson *et al.* 1994; Runnels *et al.* 1995; van Andel & Runnels 1987), the Melos Project (Renfrew & Wagstaff 1982), the Nemea Valley Archaeological Project (Cherry *et al.* 1988; Wright *et al.* 1990), the Pylos Regional Archaeological Project (Davis *et al.* 1997; Davis 1998; Zangger *et al.* 1997), the Methana Survey Project (Mee & Forbes 1997a), the Boeotia Project (Bintliff & Snodgrass 1985), the Lakonia Survey (Cavanagh *et al.* 1996; 2002), the Northern Keos Survey (Cherry *et al.* 1991a), the Kythera Island Project (Broodbank 1999), the Western Messara Project (Watrous *et al.* 2005), the Langadas Survey Project (Andreou & Kotsakis 1999; Kotsakis 1994) are just a few notable examples. Although many of the earlier surveys covered substantial areas more extensively, the intensity of survey in the Aegean today is thought to be greater than anywhere else, resulting in a massive increase in site densities and the identification of smaller sites, though sometimes with very small areas covered in more detail to the detriment of the wider picture (Alcock & Cherry 2004a; Blanton 2001; Cherry 1983b: 392; 2004: 30). One of the first projects to mark this introduction was the University of Minnesota Messenia Expedition (McDonald & Rapp 1972); even if its intensity was not as great as modern criteria might require, its aims were nevertheless holistic. In 1982, Dyson described this project as 'the only survey conducted in Greece whose data base allows any type of sophisticated analysis' (Dyson 1982: 91). Bennet & Galaty (1997: 96-97) have described the Argolid Exploration Project and the Melos Project as the other two pioneering surveys in the Aegean that incorporated a range of new methodologies, some already developed in New World archaeology. One of the characteristics of many earlier surveys was the focus on prehistoric landscapes with little interest in what succeeded them. The focus has now shifted to a diachronic investigation of each area, with the aim of identifying the archaeological landscapes of all periods and of developing a longitudinal understanding of artefact distributions across the landscape (Morris 1994b: 6).

Overall, Alcock & Cherry identify ten features that characterise many of the more recent surveys in the Aegean:

> '(a) A clearly demarcated territory as the target of fieldwork. (b) The region itself as the focus of research design. (c) The use of labour-intensive pedestrian survey by teams of surveyors. (d) A more systematic approach to the coverage of terrain, often involving explicit sampling designs. (e) Carefully thought-out procedures for standardizing the

collection and recording of data. (f) An interest in recovering information about the full range of archaeological phenomena surviving on the surface, including very small-scale sites and (often, but by no means always) 'non-site' or 'off-site' artifact distributions as well. (g) The full integration within project design of studies of erosion, alluviation, soil formation, coastal change, vegetation history, etc., since landscape settings are not static and are themselves impacted by human occupation. (h) The expansion of regional projects to become progressively more multi- or inter-disciplinary (e.g. through the incorporation of parallel studies in such fields as cultural anthropology, ethnohistory, ethnoarchaeology, historical geography, archival research, analysis of travel literature, geophysical prospection, etc.). (i) A growing interest in the material culture and regional archaeology of the Mediterranean in periods (e.g. Arab, Frankish, Crusader, Venetian, Ottoman, early modern) hitherto undervalued or poorly studied by earlier surveys. (j) Greatly increased use of relational databases, Geographical Information Systems, and the Internet for storing, analyzing, and serving data.'

(Alcock & Cherry 2004a: 3).

Survey has been characterised by an immense experimentation and flexibility of field techniques in an attempt to achieve the best possible results in the time available. Some innovations were limited to specific projects and others quickly took over Aegean survey as a whole, with modifications along the way. An interesting example of this is the introduction of clickers on the Boeotia Project for counting sherds on the ground, which were enthusiastically advertised by Bintliff and Snodgrass in 1985 as being very useful and inexpensive (Bintliff 1985: 201; Bintliff & Snodgrass 1985: 131) and are later found to be a standard item in the fieldwalker's kit on a number of surveys (though on the Kythera Island Project, for example, clickers were used for counting paces in a tract rather than counting sherds). One of the problems of this flexibility is an often bewildering variation in methodology between surveys and even within surveys (e.g. Plog *et al.* 1978). In seeking a balance between maximum resolution and efficiency within the set time and funding constraints of each project, there have even been cases where intensity has been decreased within the lifetime of a project (e.g. on the Boeotia Project, where walker spacing was increased to 15m and site collection from circle sampling to minitracting; Bintliff & Snodgrass 1985: 132-134). Furthermore, the term 'survey' has been used to describe a variety of research programmes not all of which involve formal tractwalking (Cherry 1983b: 380-381; 2004: 28). This variability is one of the major problems that have inhibited the comparison of data from different surveys. The problem becomes even greater when trying to compare results from extensive and intensive surveys. More precisely, although the evidence produced during extensive survey is very valuable, it cannot be used in the same way as intensive survey data because it simply does not provide a comprehensive enough picture of the archaeological landscape.

Indeed, it is universally acknowledged that archaeological survey is not without problems, and there have been important criticisms of the quality and reliability of the data it produces and the purpose of survey in archaeology as a whole (e.g. Ammerman 1981: 77; Hope Simpson 1983; Osborne 2004: 168-171). Constructive (and negative) criticism of archaeological survey has been extensive over the years and has brought on a healthy debate that has led to significant improvements in understanding survey and in finding ways to deal with many of the problems surveyors face (the literature is vast: a few key examples include Alcock 1993; Alcock *et al.* 1994; Alcock & Cherry 2004b; Barker & Mattingly 1999-2000; Blanton 2001: for review of Barker & Mattingly vols.; Cherry 1983b; 1994; 2003; Cherry & Shennan 1978; Dyson 1982; Plog 1976; Plog *et al.* 1978; Schiffer *et al.* 1978; Shennan 1985). There is no doubt that survey methodology influences data recovery, but the variety of landscapes encountered in the Aegean and the practical factors limiting survey projects, such as funding and time constraints, mean that flexibility is essential in order to be able to deal with the specific requirements of each individual survey and to provide the maximum results possible (Millett 2000b).

The problem of accessing substantial areas within a limited amount of time has necessitated the introduction of appropriate sampling strategies that allow for both maximum efficiency and data reliability (Cherry 1983b: 403). The nature of survey data as 'at best ... a partial and often biased sample' of the actual archaeological landscape (Cherry 1983b: 381) means that sampling strategies as a whole require careful planning and deployment. Ammerman (1981: 78-79) and, to an extent, Bintliff (2000: 7) and Hope Simpson (1984: 116) have rejected sampling strategies as being inappropriate for survey. However, although it is true that excavated material is stratified whereas survey material is scattered across the surface, it is also been suggested that surveys on average sample greater proportions of their specified study areas compared to excavations: Cherry (1983b: 383) has estimated an average of 20-40% coverage in survey compared to 5-10% in excavation, though the results of recent surveys that utilise sampling strategies suggest that the figure for survey coverage is more likely to be 15-20% (e.g. Cherry 1982: 16: 20% of Melos; Cherry *et al.* 1991b: 16: 15% of Kea; Jameson *et al.* 1994: 218, 224: less than 20% of the southern Argolid; Mee & Forbes 1997b: 33: 20% of Methana). Binford's influential 1964 paper calling for 'research designs based on the principles of probability sampling' outlined the problems that can result from inadequate sample sizes and methods. The most appropriate sampling schemes for survey have been the focus of discussion by a number of scholars since the 1970s (e.g. Cherry *et al.* 1991a; Cherry & Shennan 1978; Dunnell & Dancey 1983; Foley 1978; Judge *et al.* 1975; Mattingly 2000; Plog 1976;

Plog *et al.* 1978; Read 1975; Redman 1973; Schiffer *et al.* 1978; Thomas 1975; Wright *et al.* 1990). Probability sampling is appropriate for regional survey because it allows the estimation of degrees of accuracy and bias, and strives to increase the former and reduce the latter (Read 1975). However, the need for multi-stage sampling has also been supported since the 1970s; in this case sampling procedures for each stage are modified, based on the knowledge gained in preceding stages (Judge *et al.* 1975: 89). Plog *et al.* (1978: 405) have suggested that a comprehensive sampling design should include probability sampling in the earlier phases, and judgemental sampling in the later phases as the surveyor's knowledge of the study area increases. The two basic populations that are available for sampling are the region and the site (Binford 1964: 433) and therefore an integral part of the sampling design will be decisions regarding the choice of actual survey area, as well as of the sections that will be formally tractwalked within it (Plog *et al.* 1978: 384-385). It has been suggested that fairly small sampling units (Plog 1976: 151, 157; Plog *et al.* 1978: 401), within long and narrow transects at set intervals (systematic sampling; Read 1975; Redman 1973), achieve most precision and least bias and are therefore the most statistically reliable. One of the key points in favour of sampling is that it allows the investigation of greater areas and, as Blanton (2001: 629) has aptly pointed out with regard to extensive survey in Mesoamerica, 'some of the most important issues engaging Mesoamerican archaeologists pertain to social, cultural and demographic processes found at these large scales of human interaction'. Although Blanton's corresponding criticism of intensity in Mediterranean survey is unlikely to be universally embraced by Mediterranean specialists – the problems in obtaining accurate and quantifiable data from extensive methods are only too well-known (Cherry 2004: 30-31) –, there is a need to strike a balance between regional and local scales, and sampling offers a very good solution. Sampling strategies extend also to the investigation of sites and their mode of collection, something that will depend on the nature of each site. Collection of material for later study rather than field investigation is also important, as it allows one to ask a wider range of questions, the re-study of material at a later date if necessary and, overall, a more comprehensive investigation of a site (Plog *et al.* 1978: 406).

One of the main issues in survey is the visibility of material on the surface and what it represents. Visibility may be quite favourable in the Mediterranean overall, but there are localised problems that seriously affect the recovery of archaeological material. These problems include impacts from geomorphological activity (erosion and alluviation), as well as past and present land use (farming practices and recent agricultural intensification, including terracing, industrialisation, urban development, settlement or short-term human activity, soil transportation e.g. through bulldozing or manuring). The effect of these processes will vary on regional and localised scales (Bintliff & Snodgrass 1988b; Grove & Rackham 2001; Millett 2000a; Schiffer 1987). Eroded alluvial soils can bury sites partially or completely, and in certain cases permanently. Permanent burial of sites is a particular problem in cases of major alluvial coverage over large areas, such as coastal plains or inland basins, where deposited soils may have considerable depth, therefore minimising the chances of site material ever reaching the surface through ploughing or other processes. Sites that are partially buried can result in misrepresentation in terms of their extent and the range of materials within them and, in the worst case, they can have the appearance of off-site distributions. Another result of soil movement is the relocation or the 'smearing' of sites. In the case where soil is simply washed down the slopes, sites may be partially or wholly relocated to a lower elevation. An example of this can be seen on the Kythera Island Project at site 089, which has FN-EB I and Classical material. The material was visible in a section, and the FN-EB I material was found lying in a deposit stratigraphically above the Classical material (Broodbank pers.comm.). It is therefore clear that the former is not *in situ*, but has been washed down the hill (cf. Chapter 4). It is imperative that geomorphological processes are considered carefully in all survey areas. The universal validity of Ammerman's statement that sites appear and disappear, resulting in an only partly visible prehistoric landscape at any one time (Ammerman 1981: 82; cf. also Barker 1991: 4) has rightly been disputed, as the evidence from a number of surveys has shown that this depends on the specific geomorphological processes in each individual survey area (Cherry 1983b: 399). There are further arguments that areas should be resurveyed in order to understand how vegetation and other disturbances affect site data, as certain types of land use (e.g. fruit groves) seem to increase the chances of locating material on the surface (e.g. Ammerman 1981: 82). However, this is often bureaucratically impractical and, in fact, many projects take these issues into account without having to cover the same ground repeatedly; in any case, the relationship between land use and site visibility is not that clear cut (Davis & Sutton 1995). The effects of vegetational cover on archaeological material densities have also caused much concern for survey archaeologists, and some projects have quantified visibility in a formal manner, with the intention that such numbers could then be used for adjustments to the number of sherds that should actually be present in low visibility areas (e.g. Bintliff & Howard 1999: 53). Such weighting is fraught with problems, particularly as investigations into the effects of visibility have shown that visibility can be better than suggested by fieldwalkers, and therefore multiplying it can result in gross inflation of sherd numbers in the 'low visibility' areas (Given 2004: 16). Exploration of visibility and its effect on the recovery of survey data has shown, on the one hand, that the use of multipliers is problematic because it ignores the variability in dynamic landscapes and, on the other, that there is no linear relationship between sherd quantities and visibility indices (Bevan & Conolly 2004: 127-128; Schon 2000: 110). It has become apparent in recent projects that material can be detected in low visibility areas, just as good visibility areas often produce no material whatsoever (Bevan & Conolly 2004 for Kythera; Davis & Sutton 1995 for Nemea).

Observations on the Boeotia Project have suggested that visibility problems result in a low number of small sub-0.1ha prehistoric sites, which are identified accidentally, with slower fieldwalking and more scrutiny or within later period sites (Bintliff *et al.* 1999). It has been claimed that this is a problem throughout southern Greece and that tiny prehistoric ceramic concentrations of as low as 2-3 sherds may in fact represent actual sites (Bintliff *et al.* 1999: 161; Bintliff 2000: 5). The theory of a *hidden prehistoric landscape*, regarded mainly as the result of poor preservation of prehistoric material, has been challenged by a number of survey specialists (e.g. Barker 2000; Davis 2004; Mee & Cavanagh 2000; Schon 2000; Thompson 2000; cf. also Chapters 4, 6 and 7 for the areas included in this research), who have not identified similar phenomena in other surveys (some have in fact revealed prehistoric sites void of later material and, in some cases, sites with only Neolithic or Early Bronze Age material). If anything, it is possible that extreme cases of hidden prehistoric landscapes will be observed in larger basins/drainage systems with a potential for more dramatic geomorphological activities, which are more likely to impact significantly on the preservation of ancient landscapes (e.g. Krahtopoulou 2000).

Nevertheless, archaeological material from all periods is not equally distinguishable. This is possibly due to limited excavations of certain period sites – thus resulting in an impoverished range of pottery types and few diagnostics – and may indeed be further exacerbated by the poor preservation of many prehistoric ceramics because of longer deposition or poorer firing (Malone & Stoddart 2000). Based on his investigations of prehistoric Aegean Mainland pottery, Rutter (1983: 139) has identified the EN-LN, EH II, MH and LH III as high visibility periods and FN-EH I, EH III and LH I-II as low visibility periods; he has also pointed out that EH III can be restricted spatially to certain regions, and that the decrease in the number of settlements in EH III may have been overrepresented as a result of poor visibility. He has therefore suggested that compiling a list of known ceramic wares for each period within the survey area, estimating their frequency from excavations and establishing the relative visibility of the more common ceramic types in each period would help minimise the bias created (Rutter 1983: 138). Hope Simpson (1984: 117) has stressed the importance of ceramic sequences from excavations within a survey area, which can provide a local reference point, particularly for the identification of coarse wares, as he feels that fine wares rarely survive in good condition in the plough zone. An important insight by Rutter was the suggestion to explore ceramic fabrics, as they can be an important indicator when diagnostic features are limited (Rutter 1983: 140). Fabric analysis has now become an integral part of the study of survey pottery (Moody (1987) was one of the first to incorporate this into the survey of Akrotiri near Chania). Runnels (1983) highlighted the value of lithics as good chronological indicators and suggested that they should be collected systematically (something that has become standard practice today), whereas Malone & Stoddart (2000: 95) have drawn attention to the need to look at pottery and lithics together for a better understanding of human activities in the landscape. These are a few of the suggestions aimed at identifying prehistoric material in survey, but one needs to bear in mind that the preservation of material will also depend on production methods and depositional processes, which may vary from one area to the next.

The processes that affect archaeological material (the way it was manufactured, its use, taphonomy and geomorphology) are intrinsically linked with one of the primary issues featuring in Aegean survey, the assignment of site status to surface scatters. A multitude of definitions have been attributed to the term 'site' (Gallant 1986; Plog *et al.* 1978; Schofield 1991). One example of a definition of sites applicable to the Mediterranean is the following: '1). It must exhibit definable limits. 2). It must contain evidence of more than a single occurrence of human activity. 3). If no other criteria exist for defining a site, then an artefact density must be greater than 5 artefacts per sq.m'. (Doelle 1977: 202). Cherry (1983b) and Plog *et al.* (1978: 387) have pointed out that the third criterion is far too rigid, as it would exclude most artefact scatters in many Aegean surveys. Jameson *et al.* (1994: 221) have stated that 'the term "site" is ... nothing more than a convenient way to designate a locality where cultural materials are found, apparently belonging together'. This definition is definitely ambiguous and open to interpretation, but this flexibility allows for the idiosyncrasies of each individual survey area. Furthermore, ceramic densities and types within a site are thought to vary depending on supply patterns (Alcock 1993; Millett 1991), though it has been suggested that this is not as acute a problem with prehistoric pottery because it is often locally produced (Malone & Stoddart 2000: 101). Scatters under 0.1 ha have also tended to be regarded as non-sites, but evidence from the Keos survey has shown that sites can be as small as 0.02 ha in extent (Cherry *et al.* 1991b: 20). The criteria for identifying a site will inevitably vary within and between surveys. There is no 'magic number' of sherds that constitutes a site when one considers all the processes that affect surface material and also that different human activities may leave different signatures in the archaeological record; ultimately the decision to assign site status to an artefact scatter will depend on the perceptions of the individual surveyor (Plog *et al.* 1978). Dunnell & Dancey (1983: 271) have stated that 'distinguishing a site and setting its boundaries is an archaeological decision, not an observation'. Whether a scatter represents a site, wash, manuring, a broken pot, or other non-site activity is more of an issue for small, lower density scatters that are harder to define and which are also the ones that tend to reflect the lower range of settlement in a rural landscape. Although a hidden landscape may not constitute the norm, the smearing of surface material does affect site integrity and can be detrimental to the identification of the smaller sites (Cherry 1983b: 379). Understanding the relationship between site and non-site data is essential for the successful definition of sites within a survey, and the acceptable ceramic density for a site will be higher or lower depending on the overall 'background' distributions (Bintliff & Snodgrass 1988a: 70). Cherry (1984a: 120) has observed that 'sites can only be defined reliably and objectively in the context of quite detailed knowledge about the overall pattern of variation in artifact density and distribution throughout the survey region'. The first survey project in the Aegean to collect off-site data was the Nemea Valley Archaeological Project (Davis 2004). The concept of a continuous landscape of human activity where sites are identified as peaks in the overall distribution of surface material is widely supported (e.g. Bintliff & Snodgrass 1988b; Cherry 1983b; Gallant 1986; Given 2004), and this also constitutes part of the theoretical background to 'non-site' survey, a form of survey that has been advanced by several scholars, most notably Thomas, who suggests that one should focus on the artefact as the minimal unit of investigation (Thomas 1975: 62; cf. also Dunnell & Dancey 1983). But even if survey is site-oriented, focusing on the artefact, rather than the site, allows for a more accurate interpretation of surface scatters. Gallant (1986: 409) states that 'after all, no one lived, worked, and died solely within the confines of his or her own settlement'; if we ignore the archaeological remains beyond the site, we inherently deprive ourselves of the 'wider picture' of human activity and interaction within the landscape.

In his 1983 article, Cherry identified three basic requirements for a successful survey: 'collection of multi-period data, regional scope and dependence on interdisciplinary teamwork' (Cherry 1983b: 387). Multi-stage, intensive and systematic survey, combining a range of appropriate sampling strategies, recording methods and collection practices and incorporating specialist knowledge of the archaeological record and the local environment, produces the most reliable survey datasets for the quantification and interpretation of past landscapes.

3.2.2 What are we doing with the data? Settlement patterns, demography and comparative approaches

Aegean archaeologists no longer need to justify the implementation of survey. Survey methods have reached highly sophisticated levels and the abundance of surveys carried out in the last few decades has resulted in a very rich Aegean dataset (Cherry 1983b: 382; 2004: 27). The material recovered from survey has much to offer, because of the sheer number of sites recovered, the chronological periods they span, the fact that all sites within a region are studied under one methodology and because of the focus on the broader landscape (Broodbank & Kiriatzi n.d.b). The recent publication of a number of intensive systematic surveys allows for re-analysis of data and for the development of new ideas on the socio-economic structures of the past (Cherry 2004: 29). This is also made possible with the introduction of new investigative tools that allow quantified analyses of permanent and statistically meaningful study collections, something that had not been achievable before, at least not to the same extent.

The question that Alcock & Cherry ask in the introduction of *Side-by-side Survey* in the Mediterranean is 'what is being done with all the newly available data resulting from this fieldwork?' (Alcock & Cherry 2004a: 3). The most prominent work of the last few years that looks into survey and the interpretation of survey results is the POPULUS Project, which produced five volumes of papers presented at five colloquia, dealing with different aspects of survey in the Mediterranean region: population, environmental reconstruction, GIS, analytical techniques and survey methodology and interpretation (Barker & Mattingly 1999-2000). The publications have received criticism from both Old and New World survey specialists. Blanton (2001) talks of 'Mediterranean myopia': he finds that although the colloquia were aimed at finding common ground in research goals and methodology in Mediterranean landscape archaeology, they have instead maintained region- and site-specific research goals and methodology that only inhibit comparative approaches. Cherry's criticism is more constructive, and although he agrees with Blanton on the localism of the papers presented, he also acknowledges their value in terms of outlining 'diverse methodologies and interests, worked through in a huge range of different landscape settings' (Cherry 2002). What Alcock & Cherry point out together, however, is that the POPULUS volumes do not go deep enough in dealing with the problem issues of survey, such as site definition, the relationship of on- and off-site data, survey intensity, sampling, dating, site contemporaneity, survey comparability (in methods and results) or local geomorphology and landscape change (Alcock & Cherry 2004a: 5).

Two of the most important aspects of survey are the ability to use its data to understand long-term cultural and socio-economic change and to uncover the rural landscape, which tends to be neglected and understudied in excavations that often focus on the larger 'more important' sites (Alcock 1993; Barker 1991; Cherry 1983b). Despite the use of survey in identifying the rural landscape, there are fears that these new smaller permanent or seasonal sites are simply being thrown into the 'farmstead' category – a term widely used to define small agricultural settlements – without the required investigation into what these sites might actually represent in terms of their location in the landscape and their function, or the duration of their use (Cherry 2004: 29; Foxhall 2000; 2002; Pettegrew 2001). The terms 'site' and 'settlement' are often used to express similar entities, but they are not the same thing (Carman 1999; Schofield 1991), the former reflecting an archaeological scatter of material in the landscape which could have a range of functions, e.g. a production site, or a temporary shelter, the latter implying a place where people reside. This goes back to the definition of the term 'site' discussed in the previous section; a more function-oriented definition of archaeological sites has been provided by Judge (1975: 83):

> 'Archaeological sites represent the activity loci of cultural systems. Activities are differentiated spatially; a single archaeological site cannot be expected to reflect all of the activities of a particular cultural system. Sites are merely components of larger and more inclusive settlement systems. Research with the goal of explanation of cultural systems and processes must, then, be framed in such a way that the total range of types of component sites is examined.'

This highlights the range of activities that can take place on an archaeological site, and further draws out the importance of examining sites not only on their own, but also as part of a larger network in which the roles of different sites are often complementary. Furthermore, if sites are locations from which populations exploit the surrounding landscape (Dunnell & Dancey 1983: 271-273), a case that is more likely in rural subsistence-oriented communities, then the exploration of function should also address the environmental context of a site. Function is intrinsically linked with date and size, the other two key elements that constitute part of defining a site, and specific problems concerning each element can have an effect on the other two. The duration of use of these small rural sites produces further headaches; sites tend to be palimpsests of past human activity that do not necessarily reflect simultaneous or continuous occupation throughout, whereas chronological divisions normally span a century at least, with the FN-EBA divisions discussed here being far greater (Cherry 1983b: 379; Foxhall 2000). It is therefore misguided to explore uncritically the visual pattern that survey data provide for each chronological period without considering the more short-term cycles of sites that make up this pattern. On several projects, such as on Melos, in the southern Argolid and on Kythera, the FN-EBA time-span of 2200 years has been broken up further into sub-phases, thus allowing for a slightly more refined understanding of each site (Broodbank 1999; Jameson *et al.* 1994; Renfrew & Wagstaff 1982). Site size and ceramic density are often used to determine the duration of a settlement, population numbers and settlement hierarchy. The problem that emerges in trying to identify social strata present is that the relationship between site size and social hierarchy is not always linear (Cherry *et al.* 1991b: 34), although this may be more of an issue in the case of large sites (Alcock 1993: 53). Alcock has stated that 'site sizes ... refer only to the artifact spread created by the use of habitations or other structures at the individual settlement' and therefore the size of a scatter is 'a proxy measure for the size of these residences or these productive units, and depends on their longevity and intensity of use' (Alcock 1993: 58; though taphonomy is also an influencing factor). This becomes more complicated in the case of multi-period sites, where it is not enough simply to look at the size of the overall scatter, because this does not indicate how a site has changed through time or the variations in the nature of the site from one period to the next. The Nemea Valley Archaeological Project was the first survey to look at the size of sites for each period individually (Cherry *et al.* 1988; Wright *et al.* 1990). If we are really going to get to grips with changes in settlement patterns and population through time, the definition of a site needs to be period specific.

Regional demography has been a major focus in archaeological survey; the growth or decline of a population can be reflected in the number and size of sites; intensive and systematic survey can provide information on population estimates in a region for a given period of time, demographic change over longer periods, regional variation of population trends, and populations against the carrying capacity of an area (Sbonias 1999a: 1-2). Having said that, recent survey publications have indicated a reluctance to produce population estimates despite the potential of survey data (Osborne 2004: 164). There are, of course, those who doubt that prehistoric data can be reliable demographic indicators altogether (Bintliff & Sbonias 2000: 245), whereas others are sceptical of the ability of survey data to produce absolute population numbers (Osborne 2004: 170). Ammerman claims that population studies are the 'workable alternative' to settlement pattern studies, which are fraught with problems that arise from trying to define the nature of sites recovered from survey (Ammerman 1981: 75). This is hardly realistic when one considers that the estimation of population numbers from survey data will depend on site chronology, size and function, all of which form part of this site definition, and furthermore there are additional issues to deal with, such as the inhabitants and spatial extents of the average household, the permanence or seasonality of settlements, site contemporaneity and population growth rates (Cherry 1979; Whitelaw 1991a). It would seem that, on the contrary, a clear understanding of an area's settlement patterns is a prerequisite for reliable population estimates. Osborne observes an increasing confidence in the relationship between the size of settlement scatter and the number of inhabitants, though it is true that settlement size cannot always be determined because of the transformation processes that affect archaeological surface distributions (Osborne 2004: 169). However, he also observes that small sites are often taken to represent only single farmsteads irrespective of their actual size. This disregards the dynamic nature of rural settlements in terms of growth and decline and, therefore, their reflection of demographic change; it is the ability of survey to reveal the rural landscape that brings its less obvious populations into the forefront (Alcock 1993). The significance of the rural landscape is played down by Osborne, who believes that the larger settlements are the ones that have the greater impact on population size (Osborne 2004: 170). It would seem, however, that in order to obtain a comprehensive demographic picture, it is necessary to look at both rural and urban sites together (Cherry 2002; Stoddart 1999).

The demographic measurement of rural and urban sites each comes with different problems; rural sites can be underrepresented, they are more likely to have varying occupation length within a single period and they may be seasonal or in some cases non-residential (storage buildings, animal shelters); urban or semi-urban sites are also likely to incorporate a range of public and non-residential spaces (in the form of structures or open areas) and may differ in their characteristics between areas, which means that using information on layout from excavated sites outside the study area could be misleading (Whitelaw 2001: 16-17). Also the spatial extents of a household or the number of people within a household may in fact vary between small rural and larger sites, even within the same area; variations in population densities can occur on both temporal and spatial levels (Kramer 1980: 316). Whitelaw has argued that distinction between seasonal and permanent settlements is difficult to establish because the material recovered may be similar in nature (Whitelaw 1991b: 413-418; 1994: 168-169; 2000: 229). He does point out that the production and deposition rates of archaeological remains could provide information, but that this is inhibited by the quality of current dating and recovery processes (Whitelaw 1994: 168-169). However, he also argues that the over-estimation of sites as a result of this can be counter-balanced to an extent by the under-representation of sites in certain periods due to preservation conditions or survey sampling methods (Whitelaw 2000). Site contemporaneity can be dealt with partly by weighting sites in each period by its length (Cherry 1979); on the one hand, this reduces the population estimates to more realistic levels and, on the other, it renders possible the comparisons of periods of different time lengths.

A second method of looking at population estimates and fluctuations through time has been through the exploration of land-carrying capacity (Sbonias 1999a; Wilkinson 1982; 1989). Its application is in some ways more problematic than that of site size. Rates of intensification of land use are often thought to be indicated by the presence of non-site data reflecting manuring (Bintliff & Snodgrass 1988b; Sbonias 1999a; Wilkinson 1982). This has been disputed by Alcock *et al.,* who discuss a range of explanations for the presence of off-site data in the landscape (Alcock *et al.* 1994). What is more, estimating population numbers based on how many an area can hold does not consider subsistence regimes that involve the creation of surplus production (Kramer 1980), nor social structures where subsistence is partly sustained through external contacts (Jameson *et al.* 1994). Looking at land-carrying capacity exclusively can be misleading; its exploration at a second stage in conjunction with site size, however, could be productive.

With regard to the points raised so far, a number of issues and questions arise with regard to the interpretation of survey datasets:

1. Do we need to retain the term 'site' for our survey context?
2. If so, what is the size of a site? (What is the relation between material scatter and site size?)
3. What is the chronological time-span of a site? (What was the duration of settlement occupation and was it continuous or repeated?)
4. Is the size of a site a reflection of one contemporary settlement across the total area or spatial shifting of a smaller settlement over time, and have some sites increased with time?
5. What is the function of a site? (e.g. settlement, production site, burial, animal shelter, storage building?)
6. Are settlements permanent or seasonal?
7. What is the household/site area ratio and does this vary between sites of different hierarchy or period?
8. What does a household represent in terms of the number of people and their relationship, and does this vary between sites of different hierarchy?

9. Is the land required by the identified settlements and their populations lower, equal to or greater than the regions' carrying capacity?

Answering all these questions in detail will not always be possible, but depending on the quality and quantity of survey data in each case, they can provide the first steps to understanding past regional demographies.

Despite extensive analysis of survey data for the interpretation of regional settlement patterns, little has been done to integrate all this survey data into a more comprehensive picture of the Aegean landscape and the similarities and variations between its different regions. The first to call attention to this fact was Cherry in his concluding chapter in Keller and Rupp's 1983 *Archaeological Survey in the Mediterranean Area* (Cherry 1983b). This volume was the first to bring together a collection of short papers on current surveys conducted in the Aegean, in an attempt to highlight issues of methodology, research design and data management. However, Cherry's optimism for new comparative studies seems to have been a little premature, as he himself admitted 21 years later (Cherry 2004: 30). The variations in data quality, patchy distributions and poor publication rates were the main obstacles for comparative analyses in the early 1980s; it is only in the last decade that most publications of major intensive and systematic surveys have started to appear (Cavanagh *et al.* 1996; 2002; Pylos: Davis *et al.* 1997; Davis 1998; Asea: Forsén & Forsén 2003; southern Argolid: Jameson *et al.* 1994; Methana: Mee & Forbes 1997a; Mesara: Watrous *et al.* 2005; Berbati-Limnes: Wells 1996) and even to this date some of them are presented only in the form of preliminary reports, as in the case of Nemea (Cherry *et al.* 1988; Wright *et al.* 1990).

The first substantial comparative work in the Aegean was Alcock's integration of data from 21 surveys across the Aegean in an attempt to understand the complex socio-political landscape of Hellenistic and Roman Greece. Attempts had been made in other parts of the world before (Mesopotamia: Adams 1981; Mesoamerica: Blanton *et al.* 1993), at a time when perhaps the data was not so readily available in the Aegean. The more recent access to a greater number of published Aegean datasets has provided the opportunity for further detailed comparative study; a number of attempts have been made in the last six or seven years, with a focus on specific aspects or periods, such as farming practices or prehistoric settlement patterns (e.g. Cavanagh 1999; Driessen 2001; Mee 1999). Although the discussions have been fruitful, there has been no explicit assessment of the variation in methods that produced the data included (this is not to suggest that they are not acknowledged as being present, e.g.

Cavanagh 1999: 50). In 1993 Alcock rightly stressed the need for 'archaeological source criticism' (Alcock 1993: 49-53) when using individual datasets, and particularly when comparing them. The 2004 edited *Side-by-Side Survey* publication (Alcock & Cherry 2004b) has brought comparative approaches to survey data back to the forefront of regional studies, along with the various factors affecting successful comparisons and ways to deal with them. Variations in methodologies and interpretations have remained an issue, as has the practice of many projects to publish the analyses and the conclusions, but not the raw data. There are still arguments that quantitative direct comparison of artefact densities from different surveys is not possible (Cherry *et al.* 1991a: 45; Given 2004: 19). These issues can be resolved to a great extent if research goals, designs and methods are described explicitly for each survey project. There has been an active attempt in recent years to produce standardised data formats in various archaeological disciplines that allow the interoperability between different datasets through the use of common linguistic thesauri and the provision of predefined types of information (e.g. Lee 2003; van Leusen *et al.* 2002). Furthermore the standard recording of metadata (i.e. information about the data with regard to what they are, how they were produced, when, who by and for what purpose, etc) makes possible the assessment of dataset quality and appropriateness, thus ensuring successful data analysis and interpretation (for GIS specifically cf. Conolly & Lake 2006: 305-313; Wheatley & Gillings 2002: 86-87). Archaeological survey has much to gain from the use of metadata standards (although this requires that the data are in digital format), as it would allow the successful integration of datasets that have been produced with different strategies and methods.

The integration of survey methodologies with many other disciplines and tools has greatly improved the quality of data interpretation. Since the early 1990s, GIS and related digital technologies have been used in regional survey for the collection, management, visualisation, investigation and formal analysis of survey data (Aldenderfer & Maschner 1996; Allen *et al.* 1990; Conolly & Lake 2006; Gaffney & Stancic 1996; Gillings *et al.* 1999; Lock & Stancic 1995; Maschner 1996; Wheatley & Gillings 2002). Spatial data collection in digital form can now be achieved through a variety of techniques, such as surveying (e.g. with GPS or total stations) or remote sensing directly from the ground, or the digitisation or scanning of paper maps. Data storage, management and querying can also be carried out within specifically designed database packages. What separates GIS from other technologies is its ability to integrate a wide range of spatially referenced databases and to query and formally analyse both their spatial and a-spatial properties effectively at regional and site scale, despite the sometimes problematic, diverse and complex nature of the data. It enables a more accurate detection of spatial patterns and data quantification in conjunction with the assessment of their significance through statistical analysis, an important element in the exploration of survey data (Conolly & Lake 2006; Goodchild 1996: 242; Mattingly 2000: 12). However, the introduction of GIS to archaeology a decade or so after the start of several major surveys means that it has mostly been incorporated retrospectively and for a limited set of applications, often simply for the visual representation of site distributions. More pressingly, it has been used primarily for the collection, management and storage of survey data, and less for exploratory data analysis and spatial statistics. If GIS is to be exploited to its full potential, it needs to be incorporated into the research design of surveys from the beginning (Conolly & Lake 2006: 48); on the one hand, this will enable the creation of a GIS tailored to the specific archaeological needs and research questions of each survey and, on the other, it is likely to result in the development of innovative technologies within GIS for better use within landscape archaeology (for an example of such innovations cf. Wheatley & Gillings 2000 for the adaptation of visibility analysis to archaeology).

The use of GIS in archaeology is not problem-free and, in particular, a major debate has revolved around whether it is a neutral tool or requires the formulation of an explicit theoretical framework (Conolly & Lake 2006: 4-11). Overall within archaeology, the use of GIS has seen a transition from the simple documentation of patterns to their far more rigorous assessment through quantified analyses and statistical testing. However, many of its archaeological applications over the last fifteen years have tended towards human ecology and systemic approaches, leaving themselves open to the criticism that they are environmentally and functionally deterministic (Gaffney *et al.* 1996; Wheatley 1993). In 1993, Wheatley was already stressing the importance of the human perception of landscape, and not just analysis of environmental properties (Wheatley 1993). This is being affirmed today by a call for investigations that also involve the perspective of the individual (Conolly & Lake 2006: 7-11). This evolution of GIS applications in archaeology seems to support the argument that it is more a neutral tool and highlights the poor theoretical assumptions that often accompany the actual data, the questions we ask and the answers we expect from them. The exploration of the human perception(s) of a landscape through GIS faces the same limitations as the use of any other analytical tool: our own preconceived assumptions will always affect the result to some extent. For example, the choice to explore archaeological sites as dots or as two dimensional scatters in the landscape, or to include their wider activity areas is made by the user not the package. Equally, so too is our choice to explore the relationship of particular datasets rather than others in ways that may lead to environmentally deterministic interpretations. Nevertheless, while being aware of these issues, it is also important to continue to work with the enormous correlative advantages of GIS. This can be done with confidence, as long as the potential deterministic pitfalls are taken into consideration. GIS is better able to provide an empirical perception of the landscape than an experiential one; in other words, it produces a formal representation of relationships between datasets and patterns in the data, but the interpretation of these relationships and patterns can only be done by the archaeologist on the basis of already established archaeological, environmental or other theoretical frameworks (Conolly & Lake 2006: 46). Nevertheless, through its unique ability to integrate and analyse archaeological and other interrelated datasets and use them to extract new information, GIS forms an extremely solid analytical tool to help us interpret the past.

An important issue that affects the quality of survey data analysis in GIS is the integration of datasets mapped at different scales. Variations in resolution are observed at a number of levels: firstly, scale can vary between surveys, for example the recording units during fieldwalking may be different. Secondly, scale can vary between different sampling stages within a survey, for example in the recording units for on-site and off-sites distributions. Finally, the scale of the various related datasets that are incorporated into the GIS project may vary: for example, the research in this thesis makes use of 1:5000 topographical maps that are based on aerial photographs of the 1960s and 1970s, and also 1:25000 geological maps that have been produced through geological fieldwork. These variations do not prevent data analysis in such circumstances and resolutions at a scale of 1:25000 or larger are sufficiently good to carry out detailed analyses (Conolly & Lake 2006: 45). However, what becomes important is that analyses of each dataset are appropriate for their scale.

This research that follows in succeeding chapters has taken into consideration the issues discussed here. Rather than claim to be using GIS as a 'tool' or recasting it entirely, probably the most accurate description of the aim of this work is the exploration of settlement change in and human interaction with the landscape in a GIS-led environment, in a way that, on the one hand, takes into consideration the dependence of subsistence economies on their surroundings and, on the other, explores the socio-cultural frameworks within which subsistence strategies of particular communities develop through time.

3.3 Selecting appropriate datasets for analysis

3.3.1 Establishing the criteria

The surveys included in this research were selected after careful consideration of the issues discussed so far in this chapter. The surveys of the southern Argolid, Methana and Kythera do have a number of differences, but in many ways they followed similar field techniques (table 3.1). The most problematic difference is the mode of site investigation, in particular the estimation of site size. The Kythera survey is the latest of the three projects and has enjoyed a highly systematic and intensive methodology, resulting in far superior data resolution to the majority of surveys fully published to date. There are, however, a number of other factors that influenced the selection, besides their potential for a comparative approach. Practically speaking, it was necessary to find surveys that have already been published, and also surveys that have yielded a satisfactory number of FN-EBA sites that can be dated to individual phases within the FN-EBA. In many ways, this research aims to be a first attempt at comparing data from different southern Aegean surveys within a GIS-led environment. The original number of selected surveys (which included the Nemea Valley Archaeological Project and the Lakonia Survey) had to be reduced because of obvious time constraints, and primarily due to the lack of freely-available, digitised survey data. This is partly due to the fact that a large proportion of surveys took place before the GIS boom and, as a result, their data were never converted to digital form, whereas other survey projects have invested in digital datasets after the end of the field seasons and the data transfer is ongoing. Therefore, we are still at a stage where any research of this kind has to take into serious consideration the data formats of the surveys in question and the time required to prepare the data for analysis (which can be fairly laborious). This particular research was able to make use of the digital datasets provided by the Kythera Island Project, but had to invest in the digitisation of all necessary information (topographic, geological and archaeological) for Methana and the Fournoi Valley.

There was another important reason behind the selection of these datasets. The three areas selected cover a range of landscapes. Kythera is an island landscape with a substantial area of gentle slope and relatively high agricultural potential; it is also a stepping stone between two cultural spheres, the Peloponnese and Crete, the influence of which is obvious at different times in the FN-EBA (and possibly in some cases overlapping). The southern Argolid, and the Fournoi area in particular, is located in a more integrated landscape of Peloponnesian (or maybe one should say Argolic) character, with a wider range of land types (uplands and lowlands). Another particularly interesting aspect of the Fournoi area is the presence of a larger settlement, not often encountered in what is normally regarded as a rural landscape. Finally, Methana is what has been considered by many to be a marginal landscape, in terms of geographical location and terrain ruggedness. At the same time, Methana also seems to be located between two fairly distinct cultural spheres in the EBA phase, Attica and the Peloponnese. Methana provides a good forum for the exploration of marginality and what it can entail. The exploration of these three areas, therefore, aims to provide a first insight into the impact of the relationship between socio-cultural choice and environmental resource-based economy on local human trajectories in the FN-EBA southern Aegean.

The following sections briefly describe the survey methodology of the three areas explored in this research. For Methana and the southern Argolid, this information has been derived from the major survey publications (Jameson *et al.* 1994; Mee & Forbes 1997a), whereas the information for Kythera has been derived mainly from personal observation during the field and study seasons and discussions with many of the specialists on the project (information can also be found on the website, http://www.ucl.ac.uk/kip, and in the preliminary report: Broodbank 1999).

3.3.2 The Methana Survey Project (MS)

The Methana Survey Project was directed by Christopher Mee, Hamish Forbes and Lin Foxhall and consisted of two reconnaissance seasons (1981-82), three fieldwalking seasons (1984-86) and a study season (1987). The volcanic peninsula of Methana is naturally bound by sea with a small isthmus connecting it to the NE Peloponnese, and covers an area of ca. 50sq.km. This was one of the reasons it had originally been chosen for investigation, along with the fact that it had been the focus of ethnographic study by Forbes (1982), and furthermore because it appears to have maintained a discernable political and cultural identity for a number of historical periods, as indicated by the presence of fortifications across the isthmus.

The original aim of the survey had been to investigate the peninsula in its entirety, but this was rendered impossible by limitations imposed by the project's permit, urban planning and extremely steep slope. As a result 21% was covered (ca. 10.5sq.km). The above limitations, particularly modern settlement and extreme slope, also affected the **sampling strategy**, which was neither random nor probabilistic. Indeed, one only needs to observe Methana to see that in places slope steepness can be so extreme as to make tractwalking impossible. Extensive survey was deployed in both the southern limestone area and to the north of Kameni, where nothing was identified, and both areas were therefore excluded from intensive survey.

Fieldwalking in 1984 was conducted by two teams of five to six people, and the following years by a single team of six, which was sometimes divided into two smaller teams depending on the terrain. Spacing between walkers was 10m. Transects (the largest recording units of the fieldwalking process) varied in size depending on topography and were walked in 'a series of sweeps' (probably the equivalent of tracts). Compass bearings were used only for the Throni valley in the south; the remaining area was walked along terraces (the peninsula is heavily terraced; Mee & Forbes 1997b). **Recording of transect artefact counts** was not implemented until the second field season, when clickers were introduced and total counts were recorded henceforth at the end of each sweep. At the end of each transect, records were kept of transect location; terrain, land use and crop cultivation; vegetation cover and visibility; architectural features; artefact density, range and date, with occasional collection; and comments, particularly on suspected or identified sites. Artefact counts were considered as a 'linear measure', and therefore sherd density was also a linear measurement of the distance tractwalked rather than of the transect area. **Collection of transect material** was rare and dating normally took place in the field.

Sites were investigated at the end of each transect; the extent of a scatter would be established and then a notional site centre would be set. A minimum 5-sherd-per-sq.m was originally set as a criterion for ascribing site status to a scatter, but this was not always implemented as the relationship between on-site and off-site counts made the presence of sites quite clear. The more uncertain sites were revisited for verification. Material was counted within 1sq.m circles (ca. 0.56m radius) at fixed intervals from the site centre in N, W, E, and S directions (when it was not possible to proceed in a certain direction, another direction was followed in proximity to the desired one). Site edges were defined by successive counts below 2 per sq.m. In cases of large sites grids were set or small transects were walked at defined intervals. **Site recording** involved the counts and types of material present, as well as visibility on a scale of 0 to 10. Counts and visibility were noted on a rose diagram (cf. Chapter 6); records were also kept of site location (bearings, description and photos); terrain and land use; visibility; architectural features; artefact density, types and date; function. **Collection of site material** was done in the form of a grab from the whole site, focusing on diagnostic sherds and lithics. Further spatial resolution was attempted, but only at larger sites where individual grabs were taken from naturally divided areas. In cases where sites could not be studied in detail, grab counts were taken and the site size was only roughly estimated. It should be noted that in the vast majority of cases site size was estimated only for the overall scatter and not for individual periods. The **study** of the pottery appears to have consisted of macroscopic analysis of diagnostics and fabrics.

The survey **publication,** *A Rough and Rocky Place,* came out in 1997 (Mee & Forbes 1997a), and articles focusing on geomorphology or post-prehistoric periods can be found in a number of journals and edited books (Forbes *et al.* 1996; James *et al.* 1994; Mee *et al.* 1991; Mee 1999; Mee & Cavanagh 2000). GIS was not used for data management during survey, nor was it incorporated at a later date. Complementary geomorphological work was carried out, aimed at a better understanding of erosional patterns on the peninsula and site formation processes (James *et al.* 1994; 1997). In terms of Final Neolithic and Early Bronze Age sites, a total of 51 sites were found to have FN-EH material, of which 26 had more than 5 sherds (Mee & Taylor 1997).

3.3.3 The Argolid Exploration Project (AEP)

The Argolid Exploration Project consisted of an earlier field season in 1972 directed by Thomas Jacobsen and, seven years later, of four more field seasons (1979-82) and a study season (1983) directed by Michael Jameson, Curtis Runnels and Tjeerd van Andel.

In 1972, four weeks were spent on relocating previously known sites and another six weeks on fieldwalking the valleys of Fournoi, Koilada and Loutro. Extensive coverage was carried out over an area of nearly 20sq.km (there was no **sampling strategy**). In 1979-82, the area of interest, excluding the major modern settlements of Dydima and Thermisi, covered an area of ca. 225sq.km. The sampling strategy during these field seasons was judgemental rather than probabilistic and excluded very built-up or disturbed areas, making the most of funding, time and previous knowledge. The aim was to include the areas around the Franchthi Cave and Halieis excavations, samples of 'diverse geomorphological and environmental units', a range of landscapes from coastal to upland plateaux, and – for comparative purposes – the drainages that had been explored geomorphologically (Jameson *et al.* 1994: 218-219). It is stated that the total area covered intensively was 44sq.km (amounting to 20% of the southern Argolid), while other areas were investigated more extensively. However, this figure also includes the more extensive coverage of 1972, not all of which was re-walked in the subsequent field seasons (Jameson *et al.* 1994: 224 - table 4.1; the Fournoi Valley, which covers ca. 12sq.km, was re-walked).

Fieldwalking in 1972 was conducted by two teams of three people, walking along linear tracts (walker spacing is not mentioned), whereas during 1979-82 it was carried out by two teams of five people for the first three years only, again walking linear tracts. Spacing between walkers was 5-15m depending on visibility. Visibility is described as having been good overall, which suggests that the more common spacing would have been 15m, though this is not stated explicitly. Teams took compass bearings, and the size and shape of tracts depended on land use, following field shapes unless in open country (1:5000 Hellenic Military Geographical Service [HMGS] maps were used). There was also a verification team that worked throughout the four field seasons, revisiting the 1972 sites and uncertain scatters located during 1979-81, as well as walking areas that had been omitted previously for various practical reasons. **Recording** was carried out in logbooks and included team composition, visibility, archaeological material or features and mode of site investigation. However, tract material was not always counted (therefore probably not collected either, though this is not confirmed in the publication).

Sites were investigated in the course of fieldwalking in similar ways in both the 1972 and the 1979-1982 field seasons. No minimum sherd density was set as a criterion, and in most cases site scatters stood out against off-site data. The more uncertain sites underwent verification. The extent of a scatter would be established and then a notional site centre would be set (site edges would be defined when sherd density reached 1 per 10sq.m). Walkers would pace from the site centre at 6-15 different bearings to ascertain the extent of the site, and a sketch would be produced. Pre-prepared **recording** forms were used to describe location, elevation, present land use, water sources, disturbances or destruction, as well as sampling procedures. On sub-hectare sites, **collection** of material normally took place along a 1m corridor (at a random bearing) that passed through the site centre and ended at the site edge. On sites with a diameter greater than 200m, a second 1m corridor was added perpendicular to the first, and in some cases the 1m corridors were split down the middle. Up to eight samples would therefore be collected for each site. In the case of larger sites (over 1 ha), between 16 and 32 10sq.m collection samples were taken, each sample area located along a random radius and at a random distance from the site centre. Diagnostic material was then collected from the whole site (individual grab samples were taken from the already divided areas of the site). In all cases samples were individually bagged and labelled. It should be noted that, as in the case of the

Methana Survey, in the vast majority of cases site size were estimated only for the overall scatter and not for individual periods. Furthermore, the **study** of the pottery was limited to macroscopic analysis of diagnostics and fabrics.

While there was an express interest in the overall distribution of material in the landscape, with the aim of understanding past land use (Jameson *et al.* 1994: 221), it seems that the recording strategies would not have yielded adequate information. Furthermore, the assignment of site status to scatters appears to have been quite liberal, as it 'included isolated features, such as a well or an inscription, but was intended to exclude materials deposited or distributed solely by natural processes' (Jameson *et al.* 1994: 221). It is not clear, based on this statement, how the project then dealt with off-site distributions, which can be the result of either natural or human activity; but clear distinctions between the two processes are difficult to achieve without collecting further information.

The first major **publication** resulting from this survey, *Beyond the Acropolis*, came out in 1987 (van Andel & Runnels 1987). The full survey publication, *A Greek Countryside,* came out in 1994 (Jameson *et al.* 1994) and the first volume of the artefact publication, *Artifact and Assemblage* (which included the prehistoric material), came out a year later (Runnels *et al.* 1995). Furthermore, a substantial number of articles have also been published in various journals and edited books (e.g. Chang 2000; Forbes 1993; 2000; Forbes & Koster 1976; Gavrielides 1976; Jameson 1976; Murray & Kardulias 1986; Pope & van Andel 1984; Pullen 1984; Runnels 1988; Runnels & van Andel 1987; van Andel *et al.* 1980; 1986; van Andel 1989; 1990). GIS was not used for data management during the survey, nor was it incorporated at a later date. However, the digitisation of the topography of the whole southern Argolid is currently underway (Pullen pers.comm.) Complementary geomorphological work was carried out, aimed at a better understanding of erosional patterns on the peninsula and site formation processes (e.g. van Andel *et al.* 1986). In terms of Final Neolithic and Early Bronze Age sites, a total of 84 sites were found to have FN-EH material, of which 46 had more than 5 sherds; in the Fournoi area in particular, 24 sites were found with FN-EH material, of which 15 had more than 5 sherds (Jameson *et al.* 1994; Runnels *et al.* 1995).

3.3.4 The Kythera Island Project (KIP)

The Kythera Island Project was directed by Cyprian Broodbank from 1998 and co-directed with Evangelia Kiriatzi from 2003. It consisted of four field seasons (1998-2001) and ongoing study seasons (2002-present). The survey constitutes part of wider interdisciplinary research and all project findings have been managed and analysed in a GIS environment from the beginning (Bevan & Conolly 2004). Preparation for the survey has included macroscopic and microscopic study of the material from Kastri, the only excavated multi-period site within the survey area (Broodbank 1999; Kiriatzi 2003). The survey has been accompanied by a detailed geomorphological study of the area by Charles Frederick and Nancy Krahtopoulou, which provides an invaluable contribution to the understanding of the formation processes behind overall artefact distributions and the concentrations labelled as sites (Bevan *et al.* 2003; Frederick & Krahtopoulou 2000).

The survey area covers ca. 99sq.km and includes most of the east-central part of the island. A combination of probabilistic and purposive **sampling** was implemented: N-S 1km transects at 1km intervals and complete coverage of areas of special interest. 43sq.km were surveyed intensively within the survey area (ca. 15% of the island).

Between two and four fieldwalking teams were deployed each year, which consisted of 5 people (there was one 7-walker team in 1998). The number of site gridding teams varied between one and three and consisted of 10-11 people. During **fieldwalking** spacing between walkers was 15m. Tracts were on average sub-hectare (fig. 3.1), walked on a compass bearing and rectangular in open country or field-shaped in recently cultivated or settled areas (clickers were used for counting paces). **Tract record forms** included information on team composition, distance walked by each team member, visibility, land use, architectural features, natural resources, landscape description and artefact distributions, as well as a sketch map. Further information was added to the team logbook. Each walker also noted total counts for pottery, lithics and other finds. The **tract material collected** for later study included all diagnostic pottery and all other non ceramic finds (lithics, metal or glass).

When high densities were detected, they would be noted and revisited, and interrogated further by a second-stage method, usually gridded collection. No minimum sherd density was set as a criterion, and in most cases site scatters stood out against off-site data. The majority of **sites** were gridded in squares of 5x5m, 10x10m or 20x20m. The extent of a scatter was established and then a notional site centre was set. The grid was laid against two axes intersecting over the site centre. In each square, total artefact **collection** was carried out within a 5sq.m circle (ca. 1.26m radius). The remaining area of the square was then walked for total counts and the collection of all diagnostic pottery and all other non ceramic finds (lithics, metal or glass). Site extents were defined, sharply or loosely, on the basis of artefact densities (consecutive low counts). **Site record forms** included information on sampling schemes, land use, architectural features, natural resources, landscape description and artefact distributions. Further information was added to the team logbook. Other records included a fairly detailed map of the site's environment, as well as a detailed map of the grid, with team member composition and artefact counts (cf. Chapter 4). In cases where the integrity of sites was poor, investigation took the form of minitracting, or simply a grab sample was collected. In many cases the implementation of a grid for artefact collection has enabled the estimation of site size for individual periods. Furthermore, in contrast to the Methana Survey and the Argolid Exploration Project, the study of the pottery has involved both macroscopic and microscopic analysis (Kiriatzi 2003).

No full **publication** is available, as the artefact study is still in progress. However, articles can be found in a number of journals and edited books (Bevan *et al.* 2002; Bevan 2002; Bevan *et al.* 2003; Bevan & Conolly in press; Bevan & Conolly 2004; Broodbank 1999; 2004; Frederick & Krahtopoulou 2000; Kiriatzi 2003). Based on the results so far (end of 2003 study season) 112 sites have been found to have FN-EBA material, of which 72 have more than 5 sherds.

3.4 A comparative study of three Aegean surveys

In *Graecia Capta* Alcock places both the southern Argolid and Methana Surveys into her 'A category', which includes projects that aim to establish the 'full range of past *loci* of human activity' through the systematic recording of artefact densities and distributions over a pre-defined area, that have a structured methodology, controlled material collection and regular walker spacing, and that consider geomorphology and other post-depositional processes (Alcock 1993: 36-37). Undoubtedly the Kythera survey fits the same description.

The sampling strategies of the survey area as a whole were different in all three surveys. Besides the intensive full coverage of pre-selected areas in the southern Argolid, there also appears to be an overall preference for the more coastal areas on

Methana, which is admitted by the directors themselves. The negative consequence of this is that it is unlikely any statistically meaningful pattern will be discernible in terms of coastal preference for the actual location of sites in the past. The ability of GIS to quantify archaeological landscape means that any biases likely to have occurred as a result of the sampling strategy should be discernible. Although individual tracts for the southern Argolid are not clear from the survey publication, what are available are maps of the total tractwalked areas from all three surveys. From the southern Argolid survey the area of particular interest is the Fournoi Valley, which was fully covered with the exception of the modern settlement area. The availability of such maps enables the quantification of the archaeological landscape within a broadly statistical framework.

Turning to walker spacing, the variation between surveys suggests the possibility that overall the Methana survey was more likely to identify tinier surface scatters. Site size on the Methana survey was estimated by taking the average distance of the ceramic fall-off point from the notional site centre and using it as the radius in the formula for circle area estimations. Sites detected with the Methana spacing, but potentially missed with the Kythera or southern Argolid spacing, would have had to have an average radius of 6.5m or less (to fall between the 13m or so that was completely missed between walkers on Kythera). A radius of 6.5m produces an area of ca. 130sqm. Out of 103 sites detected on Methana, nine sites have estimated size below this value (under 9%), but only two are not associated with visible modern structures. None of these sites are of definite EBA date. It is less easy to evaluate the relationship between site spacing and site identification for the southern Argolid due to the range of walker spacings used (between 5 and 15m). If we suppose for a moment that walker spacing throughout the survey was 5m, then the sites detected with the southern Argolid spacing, but potentially missed with the Kythera or Methana spacing, would have to have an average radius of 6.5m or less and 4m or less respectively. A radius of 4m produces an area of 50sq.m. Out of 328 sites recorded in the southern Argolid publication, only three are smaller than the 50sq.m threshold for Methana (under 1% – one is associated with a visible structure), and 15 are smaller than the 130sq.m threshold for Kythera (under 5% - a third of these are associated with a visible structure); only one site is of EBA date (F18 – 100sq.m). As was mentioned earlier, walker spacing in the southern Argolid depended on visibility and as this was described as having been good overall, it is likely that spacing would have been, more often than not, at the higher end of the range. Furthermore, some of these smaller sites on Methana or in the Argolid might have been located even if the spacing was constantly at 15m. It is only in cases where the scatter is directly between two walkers that it may be missed. These evaluations may be fairly crude, but they do suggest that the number of sites located as a result of shorter spacing is probably negligible. Jameson *et al.* admit that the 1972 survey was more likely to have identified the larger sites, but as the Fournoi area (which is of most interest for this research) was resurveyed in the 1979-82 survey, this does not constitute a significant obstacle. What cannot be studied comparatively are the tract distributions, due to the lack of information available in the publications.

The subjective nature of identifying artefact scatters as sites can cause problems when attempting to compare data from different surveys; fortunately, all three surveys explore the relationship between on-site and off-site data for defining sites, rather than basing the assignment of site status on a pre-defined minimum artefact density, which is more directly affected by site formation processes. Another similarity that also strengthens the argument for assigning site status to scatters is the re-visitation of sites at a later stage for verification. The plotting of tracts and site distributions on the 1:5000 Greek army maps also suggests an equal level of accuracy in terms of their mapped location in the landscape. The consideration of visibility is another factor that is similar across the three surveys, however, its effect on site identification in the wider landscape has not been expressed explicitly in the Methana and southern Argolid publications (tract and site visibility is available for Kythera, site visibility for Methana (raw data made available by the directors) but no quantified visibility for the southern Argolid). What is different in the three surveys is the sampling strategy, which produces a discrepancy in site resolution, and the recording and collection processes, which affect the data quantification and the identification of the full sequence of chronological periods present on a site. Although there is no vacuum sampling on the Methana sites, there is, nevertheless, grab sampling on all surveys in an attempt to ensure representation of all periods. One other significant setback is the fact that no separate site size has been established for FN or EBA phases in the Methana and southern Argolid surveys, only a single site size for the whole distribution scatter.

The chronological schemes of the three survey areas are similar, the only exception being some of the Kythera First Minoanising sites that possibly extend up to 50 years beyond 2000 BC. Diagnostic material recovered from the three surveys can be used to differentiate between the FN-EBA sub-phases. Macroscopic analysis has been used in all three assemblages, although this was taken a step further on the Kythera survey, for which the pottery study has involved a much more detailed investigation of fabrics microscopically (cf. supra Kiriatzi 2003). Because FN and EB I periods cannot be regularly distinguished, the decision was taken for both the Kythera and Methana surveys to include them in a single category. Therefore, despite the fact that FN material is distinguished from EB I material in many cases in the southern Argolid, for the purpose of comparative analysis these two phases were grouped (however, they are looked at separately in Chapter 7).

In view of the problems in comparing site distributions identified through a range of methodologies, the FN-EBA site data from the Kythera survey has formed the core dataset for this research. This was done for several reasons. The Kythera survey is one of the most up-to-date surveys in the Aegean. The three strategies implemented for the discovery and recording of sites (tract fieldwalking, site minitracting and site gridding) have allowed for detailed information on site location and site resolution and, at the same time, offer the opportunity to investigate the relationship between on-site and off-site data for a more developed understanding of the archaeological landscape. Furthermore, the project has an extensive collection of interrelating digital datasets, facilitating detailed and comprehensive analyses within a GIS-led environment.

Each FN-EBA site from all three surveys has been explored individually, taking into account the mode of collection, the local geomorphology and post-depositional processes that affect site and artefact integrity, and the visibility where provided. It has also been important to explore the effects of large-scale geomorphological changes between the EBA and the present, as subsequent erosion and alluviation have resulted in the deposition of sediments inland and coastally, thus contributing to changes in terrain morphology and sometimes hydrology, and inevitably will have distorted the archaeological signatures, at least on the surface. The archaeological data for this research have included data from the survey publications and from comprehensive preliminary reports, raw data courtesy of the project directors, and additional data from my own fieldwork. The latter has involved re-visitation of the three survey areas, study of the southern Argolid survey material and re-visitation of the sites in the Fournoi Valley, study of the FN-EBA survey material from Kythera, four seasons of fieldwalking with KIP, and of the EBA material from the sites of Lerna in the Argolid and Kastri on Kythera. The site of Lerna is outside the southern Argolid survey area, but it is considered a key site for the understanding of ceramic typologies throughout the EBA. However, there is a need for ceramic typologies that are specific to each survey area, and therefore the already published data from Kastri (Coldstream & Huxley 1972) have been consulted when needed for an enhanced understanding of the Kythera survey data. The original sources for topographical and geological data were the 1:5000 army maps and the 1:50000 geology maps from Greece, with the exception of the southern Argolid, where no national geological map is available at present (for the development of a GIS for each survey, it has been necessary to bring all the topographical and geological data into digitised form). All areas have undergone geomorphological investigation, and therefore their resulting maps have also been incorporated, where published.

Data analysis was carried out in four stages: a) an assessment of the reliability of the distributions identified from each survey, b) exploration of site size, chronology and function, c) quantified analyses of FN-EBA settlement patterns from each survey and d) a comparative study of the FN-EBA landscape across the three surveys. The investigation of settlement patterns on Kythera was also combined with an intensive exploration of the FN-EBA tract data, to assess the wider FN-EBA landscape. Analyses implemented for the Kythera survey data were used wherever possible on the other two surveys, taking into account the limitations of their data, and exploring the kinds of information that can be extracted despite these limitations. Each survey had its own strengths and weaknesses and their potential was explored individually. The investigation of the Kythera dataset and its role as a baseline allowed for good control over the investigation of the other surveys.

The aim of this research has not been to use the data from these three surveys to extrapolate to the rest of the Aegean. If anything, it is made clear in Chapter 2 that the Aegean is thought to consist of varying macro- and micro-environments. Instead it forms a comparative study of changing settlement patterns and land use across a specific range of landscapes within the Aegean. Finally, a second and equally important objective has been the exploration of ways to compare surveys with different methodologies.

CHAPTER 4

The Kythera dataset: Final Neolithic and Early Bronze Age site definition and distribution

4.1 The archaeological background

The island of Kythera covers an area of 278sq.km and is located off the tip of the Cape of Maleas on the Peloponnese (fig. 4.1). Its importance for most of its past has depended on its location on a crossroads; on a north-south axis as a stepping-stone between the Peloponnese and Crete and on an east-west axis as a gateway between the Aegean Sea and the western Mediterranean. Possibly the earliest account of Kythera or, more accurately, of Kytherian populations, is found in the Linear B tablets at Pylos (Broodbank *et al.* 2004: 229). The strategic importance of Kythera's location and also its attribution as the birthplace of Aphrodite is reflected in historical and later sources (Thucydides, Strabo, Herodotus and Pausanias are but a few examples; Broodbank *et al.* 2004; Petrocheilos 1984). Accounts of early travellers to the island are numerous from the 14th century AD onwards, often focusing on coastal areas either because visitors were simply making a brief stop in the course of a voyage or because the administrative powers on the island controlled access to the interior (from the nature of the accounts it is not clear whether all travellers landed; Nikolay, Castellan, the Stephanopoulos brothers and Leake are a few for whom this is more certain; Broodbank *et al.* 2004: 230-232).

Kythera has continued to attract the attention of historians, archaeologists, geographers and geologists throughout the 20th century (e.g. Andritsaki-Fotiadi & Petrocheilos 1982; Danamos 1992; 2003; Leontsinis 1987; Petrocheilos 1984; Stais 1915). Sylvia Benton was the first to identify definite Bronze Age material, including some on the site of Kastri, however, none earlier than MM II (Benton 1931-32). Thirty years later, Waterhouse and Hope Simpson discovered EBA material at another two sites in the north of the island, Pyreatides near Karavas and Vythoulas above the harbour of Agia Pelagia (Waterhouse & Hope Simpson 1961). It was only during trial excavations in the 1960s that EBA material was identified at Kastri (Coldstream 1972a: 77-91; 1972b: 272-278; Coldstream & Huxley 1972; Hope Simpson & Lazenby 1972: 52, 55-56; Huxley & Coldstream 1972: 67, 69). The recovery of EH I-II material in conjunction with EM II-LM (Late Minoan) IB Minoanising pottery has led to the suggestion that the island formed a Minoan 'community' colony, particularly in MMIII-LMIA (Branigan 1981; Huxley & Coldstream 1972: 67). Other work on the island has included the survey of the Byzantine city of Palaiochora in the late 1980s (Ince *et al.* 1987; 1989), the survey of the Classical polis on Palaiokastro (Petrocheilos 1993) and the underwater survey at Avlemonas on the east coast (Kourkoumelis 1992; 1993). The excavation of the Minoan peak sanctuary on the southern slopes of Agios Georgios overlooking the Palaiopolis plain and Kastri in the early 1990s confirmed the strong links between Kythera and Crete, particularly in MM III-LM I (there was also sparse material dating to MM IB-MM II; Sakellarakis 1996). Furthermore, excavations conducted at Diakofti Cave by the Greek Archaeological Service have revealed prehistoric material dating from at least the Final Neolithic (Papatsaroucha 2000: 12-13). The Kythera Island Project (KIP) survey (1998-2001) has since placed ca. another 180 sites on the map, more than 100 of which have varying amounts of material dating to the FN-EBA (Broodbank 1999; n.d.a; n.d.b; Broodbank & Kiriatzi n.d.a).

To briefly summarise the KIP survey methodology, ca. 15% (43sq.km) of the island was tractwalked (the survey area itself covered an area of ca. 99sq.km). The area was covered primarily in N-S 1km transects at 1km intervals, whereas areas of special interest were covered fully. Walkers were 15m apart and walked on average sub-hectare tracts on a compass bearing, rectangular in open country and field-shaped in recently cultivated or settled areas. Tract record forms were used throughout; all archaeological material was counted and diagnostics were collected. High density areas were revisited and usually interrogated further through gridded collection. In each square, total artefact collection was carried out within a 5sq.m circle, whereas total counts and diagnostic collection took place in the remaining area. Site record forms were used throughout. No minimum sherd density was set as a criterion, and in most cases site scatters stood out against off-site data. In cases where the integrity of sites was poor, investigation took the form of minitracting or the collection of a grab sample. Finally, the study of the pottery has involved both macroscopic and microscopic analysis (Kiriatzi 2003). The study of the material is ongoing. At the time of writing, the majority of FN-EBA sites have been investigated in a preliminary way (strewing of material, identifying the archaeological periods present and noting FN-EBA distributions wherever possible) and in fact many have been studied in full (detailed study of all diagnostic material, including aspects such as fabric, shape, size, abrasion). There are only three sites that have not been collected systematically or revisited, and therefore not studied, but which appear to have FN-EBA material according to first observations. These have been added to the list of possible FN-EBA sites. The KIP survey area includes three of the most agriculturally favoured areas on the island (the Palaiopolis plain, the Livadi basin and the southern third of the large plateau including the Mitata area), as well as smaller pockets that appear to be exploited at different stages throughout the habitation of the island (e.g. the Pourko area west of Livadi, a small fairly isolated valley just inland from the east coast south of Palaiopolis, the small valley below Mitata and Viaradika north of Palaiokastro). Palaiopolis, Mitata and Livadi have been heavily exploited in past and recent times, and the notable concentration of FN-EBA sites suggests that these areas require particular attention in this investigation.

As discussed in Chapter 3, geomorphological processes and the way in which the landscape has changed since the EBA are intrinsically linked together with the taphonomic processes affecting an archaeological site and the robustness of the archaeological material present. This chapter therefore focuses on two major factors that have crucial impact on site preservation: the geomorphological processes at regional and localised scales and the potential shortcomings of the archaeological material itself. The aim of this analysis has been to establish the extent to which surface assemblages accurately reflect the subsurface archaeological remains (through an estimation of the collective reliability of these patterns) and then, using this information at a second stage, to achieve an accurate characterisation of the individual FN-EBA sites in terms of date, size and function. This is preceded by a detailed discussion of Kythera's environmental setting, which deals with the analysis of the survey area's landscape. The results of these investigations form the basis for a third stage of analysis, which involves the exploration of changing settlement patterns on Kythera during the FN-EBA and potential factors influencing FN-EBA settlement. This stage is dealt with in Chapter 5.

4.2 The environmental setting of Kythera

The island is characterized by a mosaic of hills, plateaux, basins, gorges and coastal plains that create a complex natural landscape which has encouraged human occupation to varying degrees throughout history and prehistory (fig. 4.2 – locations presented on this map will be referred to at various stages in this and the following chapter). The main flatter areas on the island are the Livadi basin in the south, the large central plateau running along the eastern edge of the Palaiochora gorges and extending as far as the gorges northwest of Palaiokastro (including the Mitata area, which is one of the main zones of FN-EBA settlement within the KIP study area), as well as the alluvial plain leading down to Palaiopolis and the area of Avlemonas, both on the east-central coast.

The **climate** of Kythera consists of warm dry summers and mild winters (figs. 4.3-4.4). The mean annual rainfall between 1960 and 1989 was 552.8mm and figure 4.5 clearly highlights the potential for variation in annual rainfall from one year to the next (Pagounis & Gertsos 1984; Hellenic National Meteorological Service). Because of its location in open seas between the Peloponnese and Crete, Kythera is often swept by strong winds that can affect access by boat even today.

The **geology** of the island has been investigated and described in considerable detail (Christodoulou 1965; Danamos 1992; Meulenkamp *et al.* 1977; Pagounis 1981: 17-18; Pagounis & Gertsos 1984: 7-9), so only a brief reference to the main geological formations is made here. The island consists of a crystallised metamorphic basement, consisting mainly of gneisses, schists and phyllites, which is observed mainly in the north of the island, and with only one smaller notable pocket further south on the west coast (fig. 4.6). About 56% of the island consists of hard limestones (these also include some dolomites), which belong to the broader Tripolitza and Olonos-Pindos zones within the Balkan area. The Tripolitza limestones form the mountain ranges on the east coast (starting south of Agia Pelagia and reaching as far as the hill of Agios Georgios, just north of Avlemonas), and on the southwest coast (starting halfway down the coast and reaching as far as Kapsali). Other notable concentrations can be found in the centre of the island and just south of the village of Aroniadika. The Olonos Pindos limestone is located mainly in the central part of the island, particularly between the two Tripolitza limestone mountain ranges. Small pockets of Tripolitza and Olonos-Pindos flysch can be found scattered in the central part of the island and they also cover a slightly greater area just north of the Livadi basin. The other major geological group consists of Neogene deposits. Of these the most important is marl limestone, covering 19% of the total island area. It can be found mainly on the Mitata plateau and in the northeast between the two mountain ranges and extends down to the Palaiopolis plain and along the coast below the southern slopes of Agios Georgios. Further small pockets of marl limestone are located on the island's northern tip and along the southwest coast. Overall, when combined with gentler slope, the light sandy soils produced on Neogene marls seem to provide the most agriculturally favourable areas on the island. Areas of alluvium are poorly mapped on the IGME geological map of the area, though Pagounis and Gertsos mention the presence of further alluvial deposits in the Livadi area and the lower part of the valley below Peristeriona Gorge to the NE of Palaiokastro (Pagounis & Gertsos 1984: 9). More detailed geoarchaeological work in the Palaiopolis, Mitata and Livadi areas, conducted by Nancy Krahtopoulou and Charles Frederick as part of KIP, has resulted in the mapping of considerable Holocene alluvium in the Palaiopolis River, as well as pockets in other areas, though less than originally expected in the Livadi basin (Broodbank n.d.a; n.d.b). The latter work is to date unpublished and has consequently not been used in this thesis save for comparative checking purposes.

Natural springs have not been mapped consistently, but they can be found across Kythera, particularly in the north and central areas (fig. 4.6). There are no perennial rivers; instead the abundant riverbeds are the main outlets for floods during the winters. Fresh water sources can be seriously affected by rainfall levels, as was indicated by the Mylopotamos waterfall, which dried out during the summer of 2000 as a result of low rainfall during the preceding winter. The island's annual water deposits are not always sufficient to cover consumption and irrigation needs, which can lead to drought in the summer; cisterns have been built to collect spring or rain water and wells opened at small depths in flysch or Neogene marl (Danamos 1992). In recent times, an increase in fresh water for drinking and general consumption in settlements has been achieved by drilling and tapping into the richer underground reservoirs (Pagounis 1981; Pagounis & Gertsos 1984). Detailed investigations of the island's hydrogeology in the 1980s and 1990s have revealed considerable underground water deposits of sufficiently good quality for today's domestic needs (Gertsos 1996; Pagounis 1981; 1982a; 1982b; Pagounis & Gertsos 1984). These reach the surface in the form of springs or natural open wells/reservoirs across various parts of the island. It is the geology (e.g. formations, size of hydrogeological basins) and the local climatic conditions on Kythera that affect the capacity of reservoirs and the permanent or seasonal flow of streams, or even their presence altogether. The flow of springs tends to be strongest in winter, whereas in some cases they may dry out completely in summer (Danamos 1992). The nature of the geological formations also affects the quality of the water and its suitability for human consumption, for livestock or cultivation (Pagounis & Gertsos 1984: 6). Spring water within the survey area tends to be of good quality, whereas the quality of water in natural or dug-out wells in the coastal areas varies depending on how discrete they are from the sea (the Tripolitza limestone masses in particular are open to the sea, and therefore the water sources are often brackish as a result of contamination by sea water; Pagounis & Gertsos 1984: 20-21, 34, 38). It should be noted that there is mention of coastal springs in areas such as Diakofti, which are not suitable for consumption due to their contact with sea water (Pagounis & Gertsos 1984: 19). Besides fresh water sources, there are areas that can sometimes form natural surface reservoirs, such as Skafidi in the Palaiopolis area (in the winter and spring of 2001 the area became a natural reservoir as a result of flooding in the Palaiopolis area). The coastline in this area has altered considerably since prehistory (cf. infra). Such areas are generally not very visible in GIS and the water is clearly not suitable for human consumption, but it can play an important role in the local ecology, for cultivation and livestock. These environments should be considered in a context of annual ecological variation, and although their appearance can be positive in the form of available water for livestock and/or irrigation, as well as potentially beneficial to some farmers who may suddenly be controlling a desirable water source in their fields, it can also be disastrous in terms of crop destruction and/or land loss.

Good **natural harbours** are fairly limited on the island. A number of inlets, such as the small double harbour at Kapsali on the south coast and the coves at Avlemonas on the west coast and Limnionas on the east coast, could have been used for safe anchorage. The modern harbour of Diakofti takes advantage of the protected bay created by the east-central Kythera coast, the small islet of Makronisi and a large mole, and today constitutes the island's safest harbour. Overall, however, the bay of Palaiopolis appears to have been the preferred anchorage in the past, as suggested by the focus of travellers writings on the antiquities of this area (Broodbank *et al.* 2004). The location of Kythera in the strait between the Peloponnese and Crete means that it is in the path of strong currents and high winds of varying directions, depending on the weather and also the time of year. At various times, the geographic location of Kythera has been crucial for controlling navigation in the seas between the island and the Peloponnese to the N and Crete to the SE. These passages were integral parts of routes connecting the west with the east Mediterranean and the Black Sea. The importance of the island for controlling sea passages and as a safe anchorage in Venetian times is thought to be further indicated in Renaissance cartography, where importance is given to the accuracy of the location of the island itself as well as to its harbours (Fotiou 2003; Livieratos & Boutoura 2003). Kythera was integrated not only into this E-W network; it was also important as a stepping stone between the two mainlands of Crete and the Peloponnese, and at different times was claimed as an extension of one or the other, or even both areas (Leontsini 2003). It is this N-S direction that appears to be important in the FN-EBA. The location of the island and its harbours has so far been discussed more from an outsider's perspective, as a means of getting to places, or controlling others who want to get to places. However, this research focuses on what was happening on the island itself during the FN-EBA, and the importance of the island to outsiders will only be assessed in terms of the effect it had on the island's demography and its subsistence and settlement strategies. There are strong indications of a protected harbour to the south of the FN-EBA site of Kastri, as well as a number of inlets along the coast leading towards Avlemonas (fig. 4.6), which have now been filled in (Bevan 2002; Broodbank n.d.a). The changes that have occurred along this coastline are also indicated by Bartsiokas, who assessed the validity of a drawing by Castellan, which depicts water in front of the Skafidi cave in 1797, a year before a destructive earthquake that is thought to have partly altered the physical characteristics of the cave vicinity. The stratigraphy, showing thick *terra rossa* over sandy marine deposits at the opening of the cave, leads him to suggest that although at some point the sea reached that far inland, by the 18th Century AD the coastline was nearer to the modern one and that the water in the drawing had to be fresh (Bartsiokas 2003; Broodbank *et al.* 2004: 234-236). The area of Diakofti (this time affected more by the rise in sea-level) may have been transformed since the end of the EBA, at which time the islet of Makronisi was possibly still connected to Kythera, thus forming a double harbour (Broodbank pers.comm).

4.3 Measuring the integrity of surface assemblages

4.3.1 Geomorphology

The impact of geomorphology has a varying effect on surface assemblages, depending on the particular characteristics of each landscape (Chapter 3). Any investigation of an ancient cultural landscape's integrity requires an assessment of the integrity of the landscape's geomorphological processes.

Ideally one would need to quantify the amount of erosion that has taken place within the survey area of Kythera between the FN-EBA and the present day in order to establish the extent to which erosion has affected the visibility of sites on the surface. Water, topography and wind are accepted as the main causes of soil erosion (Moore *et al.* 1993: 200). Erosion and sedimentation by water take place through the detachment, transport and deposition of soil. This is particularly the result of rainfall and surface water flow (Renard *et al.* 1997: 14). Predictions for the impact of water on soil erosion have been attempted since the 1930s, and as a result several parameters have been established that affect this impact (e.g. Cook 1936; Smith & Whitt 1948; Zingg 1940).

This research led to the RUSLE (Revised Universal Soil Loss Equation). The RUSLE is now widely recognised and is extensively employed throughout the world as a major soil conservation planning tool to calculate the average annual soil loss from rill and sheet erosion (van Remortel *et al.* 2001: 27). It is based on the USLE (Universal Soil Loss Equation), which was originally developed by Wischmeier and Smith (1978) for application over gentle slopes with crop cultivation. The RUSLE was a further development of this in an attempt to enable soil estimation on more diverse topography, including steeper slopes (Renard *et al.* 1997). The formula used (A = R * K * L * S * C * P) incorporates six parameters, which affect the impact of water over soil loss (precipitation, soil erodibility, slope length, slope steepness, cultivation and surface protection: Burrough & McDonnell 1998; Moore *et al.* 1993; Renard *et al.* 1997; van Remortel *et al.* 2001). Best accuracy is achieved when all factors are included (Renard *et al.* 1997), but in the case of ancient landscapes, where the information for many of the parameters could be described at best as patchy, this is not possible. Even when dealing with modern landscapes, it has been suggested that the results from the RUSLE should really be addressed qualitatively and not quantitatively, i.e. to express relative patterns, not absolute rates of erosion (van Remortel *et al.* 2001).

Discovering the extent of quantifying erosional processes that have taken place on Kythera is a complicated task that is dependent on a range of variables for which we have little information. However, as the aim here is to understand the relative erosional movement within the survey area in order to investigate the extent to which the surface material reflects the actual archaeology for the FN-EBA periods, a simplified form of the RUSLE has been used that incorporates the two topographic factors for which there is the greatest certainty of their accuracy: slope length and slope steepness, otherwise known as the LS factor, 'a measure of the sediment transport capacity of runoff from the landscape' (Moore & Burch 1986). This factor is dimensionless, but it can be calculated from a digital elevation model (DEM). The formula used here is the one suggested by Moore & Burch (1986):

$$\mathrm{LS} = \left(\frac{al}{22.13}\right)^{0.4}\left(\frac{s}{0.0896}\right)^{1.3}$$

where a is the catchment shape (diverging, converging or rectangular), l is the slope length and s the slope steepness. Its main difference from the USLE LS is that it takes into account the fact that a converging catchment will produce more sediment than a diverging one (Moore & Burch 1986: 1296; Mosley 1974). It is necessary to stress here that what this analysis explores is the removal of soil, *not* its deposition (Renard *et al.* 1997: 14). The resulting map is therefore best described as a *relative soil loss map*. Soil deposition was assessed separately and is discussed later.

Slope length is described as the distance between the starting point of flow and the point where deposition starts, or the point where flow is concentrated in a defined channel (van Remortel *et al.* 2001; Wischmeier & Smith 1978). Most measured slope lengths are between 120 and 300m, though this may not be the case for extremely diverse landscapes, such as in the case of extremely mountainous terrain (van Remortel *et al.* 2001). There are several robust methods of producing slope-length in the form of a *flow accumulation map* that also take into account the catchment shape (e.g. Dunn & Hickey 1998; Hickey 2000; McCool *et al.* 1997; Moore & Burch 1986; van Remortel *et al.* 2001). A number of methods have been developed for the extraction of flow direction and accumulation from digital data (e.g. Dunn & Hickey 1998; Hickey 2000; van Remortel *et al.* 2001). In most cases, the flow is given a cardinal or half-cardinal direction from one cell to one or two of its neighbouring cells of equal or lower elevation. The flow accumulation map in this case was produced in TauDEM (Tarboton 1997) with the D^{∞} algorithm, which does not restrict the flow path to 8 equally spaced directions. This method has already been explored for hydrological analysis of the Kythera survey area by Bevan (2002). The DEM itself (fig. 4.7a) was interpolated using the TOPOGRID algorithm. The introduction of edge effects, which would have resulted in parts of the survey area showing no data for analysis, was successfully avoided by extending the output grid by *ca.* 4km beyond the northern survey boundary and *ca.* 500m beyond the western and southern survey boundaries (the eastern survey boundary is formed by the coastline). The various pit features in the DEM were automatically filled in to achieve hydraulic connectivity during the process. It is possible that some of these pits are natural, but in many cases they will be the result of errors in the DEM (Blaszczynski 1997). Comparison of the original DEM and the filled DEM shows that the majority of filled areas are located at the bottom of gorges, whereas most of the few remaining ones are located in the Mitata plateaux, extending to the NE of Mitata village around and beyond the airport. When studied against the 4m contours of the area, it seems most likely that the overwhelming majority of the depressions are errors. The DEM was also used to delineate stream networks (Moore *et al.* 1993; Tarboton *et al.* 1991). The resulting flow accumulation map represents the area that contributes to each cell, i.e. the number of cells from which sediment would 'pour' into each cell multiplied by the cell width. This map was divided by the cell width to produce a flow accumulation that reflects the number of cells from which sediment would 'pour' into each cell (fig. 4.7b). As mentioned above, this map does not reflect the total effect of slope direction and gravity on erosional processes, because soil loss as a term does not describe the phenomenon of erosion in its entirety (Haan *et al.* 1994). Water and eroding soil will gradually reduce their speed and finally stop depending on the reduction of slope steepness. It is at these points in the landscape where soil will be deposited at a greater speed than it is removed (van Remortel *et al.* 2001). Engel (2003) suggested a method of modifying the flow accumulation map in order to reduce the soil flow path length from each cell and therefore partly adjust for this discrepancy. The slope length was accordingly limited to 150m, i.e. in the case of the Kythera 10x10m grid DEM, to a maximum of 15 grid cells (fig. 4.7c).

Slope steepness was also calculated in TauDEM using the D^{∞} algorithm (Tarboton 1997) (fig. 4.7d). The use of this parameter is based on the notion that longer and steeper slopes will result in higher overland flow velocities and inevitably greater erosion (variation in slope steepness will have a much greater impact than variation in slope length: Haan *et al.* 1994; McCool *et al.* 1997; van Remortel *et al.* 2001).

The relative soil loss map using slope length and steepness in the forms just discussed is shown in figure 4.7e. The values were binned into five categories of relative soil loss (100 represents the maximum movement of soil out of a single cell). A first observation detects a resemblance between this map and the slope steepness map, but this should not really come as a surprise: the factors incorporated into the calculations have been topographic (in fact the resemblance only underlines further the impact of slope steepness on flow direction and accumulation). It should be noted that the 150m-limit set by Engel is fairly arbitrary, and although well within the range of 120-300m suggested by Van Remortel *et al* (2001), it does not reflect the terrain variation in the landscape. Ideally slope length should be reset to zero at points in the landscape where the slope decreases sufficiently to reduce the velocity and gradually bring the soil movement to a halt (van Remortel *et al.* 2001). However, the limited software available for the creation of a flow accumulation map in which mechanisms may specify 'slope cut-off factors' ('the change in slope angle from one cell to the next along the flow direction pathway') do not employ the D^{∞} algorithm, and are therefore less accurate. Nevertheless, the overall results should be sufficiently accurate to investigate whether there is any significant relationship between site recovery and soil erosion.

When assessing the spatial relationship between the survey sites and the relative soil loss map, only four of the 112 sites with FN-EBA material (definite and possible pottery and/or lithics) are located in areas of greater soil loss (fig. 4.8); the majority are located in areas of relatively low erosional movement. When compared with the total number of sites recovered during the survey, the results are similar. When these observations were tested against the tractwalked area (chi-squared test), no statistically significant patterns emerged ($p < 0.05$). Figures 4.9a-b show the site densities (for the tractwalked area) within each relative soil loss category. The high value in the 35-40 category highlights the fact that there is only a limited area with relatively high soil loss within the formally tractwalked areas and therefore any sites in these categories will be exaggerated. These observations indicate no significant pattern of sites missed due to soil loss.

Turning to soil deposition, potentially significant sedimentation will have taken place in the coastal plains and possibly also in the inland basins, depending on the extent of erosion at higher elevations from which soil pours into these areas (the relative soil loss map shows a distinct lack of erosional movement at the bottom of all the gorges, which further exemplifies the point that only a partial model of soil movement has been constructed). Figure 4.10 shows the major watersheds of the survey area (delineated in TauDEM) in hill-shaded form, which allows the suggestion of possible alluviation areas. The drainage system that clearly dominates the centre of the island leads to the Palaiopolis plain on the east coast. Other areas within the survey limits that are potentially more affected by soil deposition are located in the valley below Mitata, the Livadi basin and the small basin south of Palaiopolis. Encouragingly, detailed geoarchaeological investigation carried out by Charles Frederick and Nancy Krahtopoulou within KIP has produced alluvial maps of the three special interest areas of the survey (Mitata, Palaiopolis and Livadi) and these also reflect more soil deposition in the Palaiopolis plain and the Livadi basin (Broodbank n.d.b). Potential alluviated areas have been crudely drawn in over the relative soil loss map in figure 4.11.

Seven out of the 112 sites with FN-EBA material (definite and possible pottery and/or lithics) are located in areas of potential major alluviation, 11 out of the total 192 sites with material recovered from the survey (it seems likely that the location of sites on alluvium as mapped by the KIP geoarchaeologists is somewhat higher). These observations were tested against the tractwalked area (chi-squared test), but as in the case of soil loss, no statistically significant patterns emerged ($p < 0.05$). In both cases ca. 6% of sites are on alluvium and site densities on alluvial and non-alluvial areas are similar. This suggests that alluviation is unlikely to have seriously obstructed the recovery of FN-EBA sites. It is striking that out of the seven sites with FN-EBA material only two have been attributed FN-EBA site status (cf. section 4.4). The remaining five (one in Palaiopolis and four in the valley below Mitata) are sites with very little or only possible FN-EBA material. However, even in this case, there are similar site densities on alluvium and non-alluvium within the tractwalked areas (1-2 sites per sq.km).

Therefore there is no evidence to suggest that sites are more likely to be obscured in the alluviated areas.

Particular attention should be drawn to the coastal plain of Palaiopolis. It is expected that soil deposition should be prominent in the area west of the Kastri ridge, and to some extent to the northeast. Within these two areas, no definite FN-EBA site has been identified below the 16m contour line. This lack of sites may be due to sediment deposition covering up the archaeological evidence, and site 144 is a characteristic example of how sites could be missed or lost in this area. It was completely covered and therefore remained undetected when the area was tractwalked, but subsequent torrential rain exposed it in the riverbed. The probable presence of a natural harbour and a number of inlets would mean that only relatively few FN-EBA sites could potentially have been there in the first place, which would have been located near the prehistoric coast. In other areas where there is relatively high soil loss, just above gentler slopes with very low soil loss, as in the case of the coastal area to the south of Agios Georgios, soil coverage is often quite thin and therefore unlikely to have obscured sites completely.

It has been suggested that subsequent terracing on Kythera has had greater impact on the visibility of sites than alluviation, particularly in the case of small rural sites dating to earlier periods (Frederick & Krahtopoulou 2000). The strong relationship between terracing and Eocene flysch and Neogene regressive conglomerates (Bevan *et al.* 2003: 224), however, brings into question our ability to easily identify FN-EBA sites in such locations, since only three sites with FN-EBA material are located on Eocene flysch and four on Neogene regressive conglomerates. Although it is clear that terracing can seriously affect site integrity, it is not possible to assess this purely from surface inspection (Frederick & Krahtopoulou 2000). The examination of all sites in relation to terracing (based on KIP site information) revealed that 36 out of the 72 definite FN-EBA sites and 20 out of the remaining 36 sites with very little or only possible FN-EBA material were located in areas of various forms of terracing. Although it cannot be said with certainty that the sites with very little FN-EBA material were definitely FN-EBA sites now destroyed by terracing alone, it is likely that at least some of these were affected by subsequent terracing,.

If, therefore, we return to the suggestions by Bintliff (1999) that sites will vary immensely in terms of spatial distributions on a yearly basis, to the point of complete disappearance or reappearance from one year to the next, there are a number of observations that can be made for the Kythera tractwalked area: the soil loss and deposition maps suggest that few sites are likely to have been missed completely as a result of erosion, the most likely locations for this being the prehistoric coast of the Palaiopolis harbour, the valleys below Mitata and west of Palaiopolis and the Livadi basin. In the Palaiopolis coastal area northeast of Kastri, the location of identified *First Minoanising* sites specifically (FMin; cf. section 4.3.2) make it unlikely that further sites would have been located between them in the alluviated shallow channels mapped by KIP's geoarchaeological team (site spacing is discussed in Chapter 5). In fact the presence of definite sites on alluvium suggests that in many cases its limited thickness and/or recent land use have brought material to the surface anyway, or that perhaps some of these sedimentation episodes were pre-FN-EBA. Furthermore, from a different angle, KIP sites were revisited from one year to the next, and the overwhelming majority were re-located. The results up to 2003 indicate that although only three FN-EBA sites are single-period (of which one is definitely sub-0.1 ha) at least 27 sites have a major FN-EBA component. The KIP tractwalked area does not constitute a hidden prehistoric landscape of the kind described by Bintliff *et al.* (1999). However, the impact of soil movement has been considered here on a fairly gross scale, which is unlikely to adequately reflect the possibility of more localised processes taking place on individual sites. Furthermore, in most cases the precise effects of terracing are very difficult to establish. There will be cases where such processes inhibit the correct identification of sites and their true extents, both within and outside the alluvial areas. For this reason, each site was further examined in the context of local topography (section 4.4).

4.3.2 Archaeology

Geomorphological processes operate in tandem with other taphonomic processes, such as subsequent human activity in areas of archaeological interest and the preservation qualities of the material itself (Schiffer 1987). The two classes of material used for dating and defining the function of a site in the FN-EBA are primarily pottery and chipped stone.

The prehistoric pottery from the Kythera survey is being examined both macroscopically (by Broodbank and Kiriatzi) and microscopically (by Kiriatzi). Stylistic attributes were originally identified by Coldstream & Huxley (1972) during excavations at Kastri, a major multi-period site within the survey area. The use of stylistic features alone compromises the accuracy of dating because only certain shapes with more robust elements will survive in survey material. Comparative petrographic analysis by Kiriatzi (2003) of the coarse fabrics collected during the survey and the Kastri excavation has now further enhanced our understanding of prehistoric pottery sequences on the island. Shapes and fabrics identified in the Kastri excavation have been observed throughout the survey area. The combination of macroscopic and microscopic analysis of fabrics, as well as the study of shapes, means that all recovered material from the survey, even the more fragmented and abraded sherds with no stylistically diagnostic elements, can provide useful information (Broodbank & Kiriatzi n.d.b; Kiriatzi 2003: 128).

Kiriatzi has identified three main fabrics for the FN-EBA period (all locally produced): chert, orange micaceous and sand-tempered (Kiriatzi 2003: 125). The chert pottery dates to the FN-EB I and is the least well preserved: it is considerably more friable than the other two fabrics and is found mainly in small and abraded fragments with no stylistically diagnostic features. The FN-EB I phases are therefore likely to be underrepresented in the survey assemblages. The methodology employed for the recovery of sites (total collection of material from a specified area within each grid square) does ensure that such biases are minimised. However, low counts of chert sherds require careful assessment, as they may be more likely to reflect sites than low counts of other more durable pottery. The orange micaceous fabric is far more durable and is found in far greater quantities across the survey area. It dates to EB II and on some sites it may also reflect an EB III date (Broodbank & Kiriatzi n.d.a). In terms of style, it relates more closely to the Peloponnese and is similar to material found in Kastri's deposit α, whereas the sand-tempered fabric dates from late EM II (at Kastri only) to MM IA, shows strong technological links to Crete and is similar to material found in deposit β and γ at Kastri (Broodbank & Kiriatzi n.d.a; Karantzali 1993: 81; Kiriatzi 2003: 125, 129). This fabric is also fairly durable and has been recovered in considerable quantities. Overall, the prehistoric material from the survey, and particularly the FN-EBA material, appears to be of less quantity, more broken down and more abraded than that of later periods. However, as long as this is borne in mind, the FN-EBA pottery assemblages can be used with confidence for the definition of sites within the survey area.

Lithics include chipped stone (primarily Melian obsidian, but also local cherts) for small tools, and groundstone (local sandstone and conglomerate) for agricultural equipment, such as grinders or grinding slabs. These have been studied for KIP in detail by Tristan Carter and Tania Gerousi respectively. So far on Kythera the chipped stone appears to be overwhelmingly associated with Neolithic or EBA material. There are four sites (out of the 112 sites with definite or possible FN-EBA material) with one piece of FN-EBA obsidian each but no definite or possible FN-EBA pottery. Out of the remaining 108 sites, 59 have both pottery and obsidian. There are only another seven sites from the survey that have obsidian but no FN-EBA association (each has one fragment). The ground stone is useful for identifying the function of an FN-EBA site, though it is equally plausible that it is associated with later prehistoric periods when it was also present (Broodbank n.d.a; n.d.b; Broodbank & Kiriatzi n.d.a).

It is essential that the cultural and environmental processes affecting the preservation of the archaeological remains be considered (Schiffer 1987). The amount of material required to define a site has to take into account the specific preservation conditions pertaining to each assigned site, as well as the durability of the material. For the purpose of this analysis, an investigation of each site was carried out *individually*, in an attempt to understand the peculiarities of each case before defining its character. It was necessary to explore the nature of the archaeological remains in combination with the geomorphological processes that have occurred within the survey area.

4.4 Defining the nature of FN-EBA sites on the island of Kythera: size, chronology and function

4.4.1 The FN-EBA dataset

The Kythera FN-EBA dataset up to the study season of 2003 consisted of 112 sites with definite or possible FN-EBA material. 72 of these have been attributed site status for the FN-EBA (the dating of 70 was based on pottery and/or lithics and of another two on obsidian). The remaining 40 sites have one or two definite FN-EBA sherds or obsidian fragments, or only possible FN-EBA material of varying amounts. A detailed list of sites with pottery and lithic counts is presented in table 4.1. All sites were explored in terms of their local formation processes and their FN-EBA diagnostic material, first of all to distinguish between on-site and off-site distributions and, second, to define the nature of each FN-EBA site with regard to date, size and function. The FN-EBA counts in the table originate from a sherd-by-sherd investigation of the diagnostic (by shape and fabric) pottery from each site. In cases where there was a greater scatter of a particular fabric, it was simply noted as such and where possible was recorded by square. This is why some sites with low definite counts have been attributed FN-EBA site status. Sites consisting of no more than two or three FN-EBA sherds or lithics derive from multi-period sites in all cases, and may reflect sites depleted by later occupation or geomorphology, or may simply indicate off-site activity. The collection and recording strategies of individual sites were dependent on site integrity and, furthermore, because the study of the material is ongoing, not all sites have been studied to the same extent. As a result, not all sites provide the same level of spatial or chronological resolution, and it is inevitable that when the study of the survey material has been finalized, further information could change the definition of some sites. However, the study of the material has already advanced substantially and the sample is of such quality that the nature of FN-EBA sites within the survey area can be characterized with some confidence. The study of all artefacts collected during tractwalking has already been completed and has revealed a considerable amount of FN-EBA material. This has been used to explore the FN-EBA cultural landscape more thoroughly and to investigate the relationship between site and tract data.

4.4.2 Site chronology

The Kythera Island Project is the only one of the three surveys explored here where the FN-EBA material clearly reflects the presence of chronologically (partially) overlapping cultural spheres. The orange micaceous fabric (EB II+) constitutes the signature of the Helladic tradition, dating to the EB II and on some sites possibly extending in use into EB III. The Cretan influenced sand-tempered fabric (or *First Minoanising* – FMin) appears primarily at Kastri in late EB II (EM IIB). Coldstream & Huxley (1972) had originally dated the introduction of this fabric to the start of the EB II phase, but this was based on the stylistic attributes of the assemblage, not the fabric. Fabric analysis has indicated that its presence on the other sites within the survey area most probably reflects a date no earlier than EB III, and in some cases possibly early MBA (MM IA). Furthermore, the stylistic elements find correlation with both west and central Crete (Broodbank & Kiriatzi n.d.a). The chronological overlap of the orange micaceous and sand-tempered fabrics clearly complicates the issue of site dating and contemporaneity. The chert fabric dates the FN and EB I phases within the survey area. As was discussed in Chapter 1, the transition between these two phases was probably fairly smooth and this is reflected in the archaeological material. In a very few cases sites have been dated to one or more FN-EBA phases on the basis of obsidian.

Table 4.2 shows the FN-EBA phases present at each site and their component values in each case. Based on the above material classifications, the surveyed area of Kythera produced 27 FN-EB I sites, 49 EB II+ sites and 36 FMin sites (figs. 4.12 & 4.13). Sites with tiny amounts of definite FN-EBA material or only possible material have been excluded (40 sites in total). Component values are based on the proportion of FN-EBA material compared to other periods, the volume of material – mainly pottery, but also lithics – and the likelihood of each scatter representing a site. Figure 4.12 also shows the number of sites weighted by century. This suggests a dramatic increase in sites between FN-EB I and EB II. This is probably realistic to an extent, though the poor durability of the chert fabric may have resulted in the identification of somewhat fewer sites. On the other hand, the slight increase in sites in EB III (FMin sites) may actually be more marked if some of the EB II+ sites also continued into EB III. Although it is highly unlikely that all sites were occupied throughout each phase, the dating of 33 out of the 72 definite sites to more than one FN-EBA phase suggests that some sites would have had life-spans longer than a century: 12 FN-EB I sites also have EB II+ material, 13 EB II+ sites also have FMin material, and seven sites date to all FN-EBA phases. There is only one case of a site dating to the FN-EB I and FMin without also including an EB II+ component (figs. 4.14 & 4.15). It is likely, therefore, that some sites saw either continued occupation or at least several phases of re-occupation throughout the FN-EBA. The shorter duration of the EB III phase (200-250 years) suggests that site continuity is more likely for this period, but the same cannot be said for the considerably longer FN-EB I phase.

4.4.3 Site size

The estimation of site size has been central to most Aegean survey publications (e.g. Bintliff & Sbonias 2000; Cavanagh *et al.* 1996; 2002; Cherry *et al.* 1991a; Jameson *et al.* 1994; Mee & Forbes 1997a; Renfrew & Wagstaff 1982; Whitelaw 1991a; 2000). As discussed earlier, the impact of formation processes in the broader landscape or in the direct vicinity of the site is extremely significant in estimating accurate site size. A minimum site size was established by calculating the area of adjacent survey squares with definite FN-EBA material, and a maximum size took into account the total area with an FN-EBA scatter potentially including in-between areas void of such material on the surface. A more realistic size estimate was then suggested by exploring the formation processes for each site in combination with FN-EBA diagnostic material (tables 4.1 & 4.3; fig. 4.16). There were cases of sites or specific FN-EBA phases on sites where the spatial resolution or the level of study by 2003 did not allow an accurate estimation. These sites have been attributed a minimum site size (the lowest range for each FN-EBA phase as described below) for the purposes of the investigation. The next section provides some examples to show how the suggested sizes were estimated, and this is followed by general observations for each FN-EBA phase.

Site 008 (fig. 4.17): This site is located on a promontory with steep slopes in all directions except the northwest, where it extends onto the Mitata plateau. FN-EB I and EB II+ material was collected from the promontory and the slopes (only one FMin sherd was recovered from the slopes): 139 of the 201 FN-EBA sherds were located on the promontory, many of which appear to be *in situ* within an enclosure and have been heavily trampled by livestock (they are mostly very small). The rest were collected from the slopes and seem to be rolling off the promontory (most sherds are very abraded). Visibility varies, though the least visible areas are the maquis-covered northeast slopes and part of the promontory to the north. FN-EBA is the major component on the site, whereas other minor components date to Venetian and recent times. The suggested sizes for both FN-EB I (0.04 ha) and EB II (0.16 ha) takes into account material on the promontory, but excludes the presumed wash from the slopes.

Kastri – site 064 (fig. 4.18): Kastri is located on a ridge leading to a small promontory in the bay of Palaiopolis. It constitutes an important settlement for most periods (with major MBA, LBA, Classical and Late Roman components). EB II+ and FMin material was recovered during the excavations in the 1960s (Coldstream & Huxley 1972). Overall, there is a significant amount of FN-EBA pottery that is scattered along ca. 500m of the ridge and stops ca. 200m from the promontory tip, which juts out into the sea. Only one square on the promontory produced FN-EBA material (4 FN-EB I and 4 EB II+ sherds). Considerable EB II+ and FMin material is located below the escarpment on terraces leading towards the Palaiopolis River on the west side of the ridge. EB II+ abrasion levels do not indicate that the material below the escarpment is more worn than that on the ridge. The material on the ridge does not continue up to the edge, but this area has poor visibility (0-40%). The lower-lying material could be washing off the ridge, but not identified in areas of poor visibility or it may be *in situ* and exposed by the river. In fact the river may actually have washed away part of the ridge in this location, which may also explain the steepness of slope; in this case the material would be subsequent wash from above. This may suggest that the EB II-III settlement extended further west. Overall, there is no clear relationship between visibility and FN-EBA counts across the grid. About half of all FN-EB I and a third of all EB II+ sherds are located in areas of 0-50% visibility (fig. 4.19). At the time of writing there were no FMin counts available, but about a third of all squares with FMin sherds also had 0-50% visibility. High concentrations of material in the central area of the grid are in the vicinity of a modern building and may have been brought to the surface during the construction of its foundations. Other areas where recent activity seems to have brought material to the surface are in the south, in the vicinity of more buildings, and on the north edge of the Palaiopolis-Fratsia road (material is *in situ* in the road section).

The highest concentrations of FN-EB I material are on fairly gentle slopes on the east side of the ridge. There are a few sherds on the southwest slopes, suggesting the possibility that part of the settlement may have been here. Material may be wash in some cases. The scatter is not uniform and therefore does not necessarily support a continuous dense settlement across the ridge. Visibility in areas between the concentrations is mixed, and there are clearly areas with good visibility that have produced no material. The material is worn overall, though there are a few sherds with relatively fresh breaks scattered randomly across the grid. Material on the tip of the promontory may be off-site or part of the settlement that has now been destroyed, possibly by the sea. Very little obsidian overlaps with the FN-EB I scatter. The suggested size for the FN-EB I settlement is ca. 1.7 ha, although it is likely that its buildings were not densely located.

Several dense EB II+ scatters have been identified on the ridge and one below the escarpment and above the Palaiopolis River to the west (cf. supra). A few sherds are located beyond the main scatter to the north and on the lower slopes to the south east. The most worn material appears to be outside the main scatters. The main concentrations are in similar areas to those dating to FN-EB I, although there is far more material and it is slightly more uniform in places. Almost all areas between the main concentrations have 0-50% visibility. Very little FN-EBA obsidian seems to overlap with EB II+ pottery. As in the case of the FN-EB I pottery, material on the tip of the promontory may be off-site or part of the settlement that has now been destroyed. The suggested size for the EB II+ settlement is 4.5 ha and includes the scatter below the escarpment, which may have been part of the settlement (if this area is excluded the size would be ca. 1 ha less).

The central area of the ridge and the area below the escarpment have FMin concentrations in similar areas to those which have EB II+ concentrations. The main differences between the two assemblages are the southern boundary, which has shifted slightly to the north, and a considerable scatter located beyond the EB II+ limits on the northern edge. Most of the FN-EBA obsidian seems to overlap with this scatter. The area between this and the central concentrations has mostly 50-100% visibility. The suggested size for the FMin settlement is ca. 4.9 ha and includes the scatter below the escarpment, which may have been part of the settlement. It is not clear to what extent the EB II+ and FMin assemblages overlap chronologically.

The area of Kastri overall has seen considerable recent activity, including the construction of modern buildings, roads and also the 1960s' trial excavations. High concentrations of material tend to be in the vicinity of these locations. It is possible that the area in between with fairly good visibility but little material is the result of comparatively limited activity (uncultivated fields and house yards).

Site 085c (fig. 4.20): The site is located on the Mitata plateau and consists of two separate concentrations of equally abraded (mainly EB II+) material. Other minor components are of FN-EB I, late MBA and LBA, Classical, Late Roman and recent date. The larger concentration spreads across a small plateau, whereas the smaller one lies just below the plateau escarpment to the northwest. Although there is a lack of FN-EBA pottery on the escarpment directly between the two concentrations, obsidian extends up to the edge. Re-visitation showed that FN-EBA pottery does in fact extend all the way to the edge, but it was not recovered during the gridding. The visibility in this area is above site average, so it is unlikely that this affected detection. However, what may have played a role is the lack of diagnostic shapes, meaning that diagnostic fabrics would only have been collected had they been in the total pick-up areas. The material below the escarpment could be a) spilling over from the top; b) a dump area for the settlement on the plateau; c) dug up material from building the church into the cliff under the site; d) more settlement area. The last seems unlikely since the settlement could easily have extended in the opposite direction onto the plateau (also it is not a common feature in FN-EBA settlements within the Kythera survey area as a whole). It seems most likely that the site was originally located on the plateau. There is insufficient spatial resolution for the FN-EB I material to estimate site size. The suggested EB II+ site size (0.6 ha) includes the plateau concentration only.

Site 164/166 (fig. 4.21): Site 164 is located on a small rise and a series of terraces falling off it to the north and east. Site 166 is adjacent to site 164 from the south and is located on terraces. FN-EB I and FMin material was collected only from site 164, and EB II+ material from both sites. Abrasion rates are similar in all areas of the two sites, though the material on site 164 seems to be rolling down from the top of the rise in a north and an east direction. There is a distinct gap between the EB II+ concentrations on the two sites (50m divide the edges of the two scatters). A quarry in the west section of this gap may have eaten into part of the site (this was not gridded). However, the east section was gridded and visibility was not particularly poor to suggest that part of the scatter was obscured. The two sites could be related but it is not clear on the basis of the scatters. Both sites also have other major components (MBA and LBA respectively), as well as other minor components (Venetian and recent). The suggested size of 164 has not included the material from the slopes to the north and east (FN-EB I: 0.07? ha; EB II+: 0.26 ha; FMin: 0.08 ha). The suggested size for EB II+ on 166 is 0.16 ha, whereas if the two sites are considered as one, the total suggested size for EB II+ is 0.7 ha.

Table 4.3 shows that it was possible to suggest a size for only ten out of the 27 FN-EB I sites. Out of these, eight are under 0.1 ha, whereas only Kastri is larger than 0.2 ha in extent (1.7 ha; fig. 4.22). Figure 4.23 suggests no particular concentration of smaller sites in the vicinity of Kastri. In fact a considerable number of sites are located on the Mitata plateau and in the valley below. It was possible to estimate the size of 29 out of the 49 EB II+ sites, 23 of which are under 0.3 ha, five range between 0.4 and 1 ha (003, 072, 074, 085c and 156), and Kastri covers ca. 4.5 ha (fig. 4.24). Ten sites with an estimated size are located on the Mitata plateau, the best preserved prehistoric landscape in the survey area, eight in Palaiopolis and only three in the Livadi/Pourko basins. Figure 4.25 shows that only two 0.3+ ha sites have a concentration of sites around them (Kastri and 085c). Sites 072 and 074 are also located in the vicinity of Kastri. Only two definite EB II+ sites are located near site 156, whereas there are no sites in the vicinity of site 003. The close proximity of sites 164 and 166 suggests the possibility that they formed a single site of ca. 0.7 ha. It is the only site located in the Pourko basin. Finally, it was possible to estimate the size of only 14 out of the 36 FMin sites. 12 sites cover extents up to 0.4 ha, site 093 covers 0.73 ha and Kastri covers ca. 4.9 ha (fig. 4.26). Eleven sites with an estimated size are located within the Palaiopolis area, where there is a concentration of both small and medium-sized sites in the vicinity of Kastri (fig. 4.27). The relatively small number of sites with an estimated size suggests that there may be other larger sites which cannot be identified on the basis of the available spatial resolution; however, it is worth noting that over half the sites with unknown size do not have enough material to suggest this. There is no strong relationship between multi-period and medium and large sites to suggest that duration affects size. The implications these observations have for site hierarchy are discussed in the general conclusion for the survey area in Chapter 5.

4.4.4 Site function

The pottery shapes identified on FN-EBA sites have been classified on the basis of descriptions used for the recording of the material during their study (table 4.4). More specific shapes have also been added. As this work by C. Broodbank & V. Kiriatzi is in progress (Broodbank n.d.a; n.d.b; Broodbank & Kiriatzi n.d.a), there are considerable gaps in the database. Nevertheless, table 4.4 indicates that most sites (for which there is information) have a considerable range of shapes relating to food preparation and consumption and storage. Sites 006, 008, 029 and 166 also have possible hearths, which would strongly suggest a domestic function (in the cases of 006 and 029 they may be portable). Over a third of all FN-EBA sites have ground stone in some form or another (Broodbank n.d.b), which might indicate agricultural processing. It consists mainly of grinding slabs, but there are also some querns, grinders and a pestle. However, of the sites in the table that have ground stone, only 004, 006, 008 and 019 have no or insignificant prehistoric material other than FN-EBA. Sites with substantial amounts of FN-EBA obsidian include 003, 004, 023, Kastri (064), 085c, 134, 146 and 156 (Broodbank n.d.b; Broodbank & Kiriatzi n.d.a). Site 023 has very little and abraded pottery. The presence of FN-EBA obsidian confirms the presence of a site, but not necessarily of a settlement. Overall, it is the presence of cores that suggests tool production on the island, and these are found mainly on coastal sites, such as Kastri (table 4.1). It has already been mentioned that the chipped stone on Kythera is overwhelmingly associated with EBA or Neolithic material, whereas the ground stone can also be associated with other prehistoric periods that may be present. Therefore groundstone can only used as a possible indicator of agricultural function. There are no FN-EB II burial remains; the only four possible burials are identified as FMin, on the basis of ribbed pithos fragments at sites 004, 101, 102 and 164.

The sites for which there is information available from the pottery study appear to have a habitational character. In some cases there are also indications of substantial storage (for example there is a disproportionate number of EB II+ jar fragments at site 008). The wide range of shapes on the majority of fully studied sites suggests that they were indeed settlements. A more comprehensive picture awaits the completion of the pottery study.

4.4.5 Tract material

In order to speak of an archaeological *landscape*, it is essential to combine the material from foci subsequently defined as sites with further potential 'off-site' material of a more problematic nature, whose significance needs to be addressed separately. The suggested causes for the presence of off-site material have been discussed in Chapter 3. Based on the relationship between on-site and off-site areas, it would perhaps be useful to divide survey material into three groups: on-site material which encompasses artefacts in areas defined as sites (this includes material recorded and collected during tractwalking and site investigation); near-site material which refers to artefacts in the wider vicinity of areas defined as sites and are most likely associated with them (this material is derived from tracts and covers the often fuzzy barrier between on-site and off-site areas); off-site material which includes artefacts at greater distances from areas defined as sites and cannot be directly associated with sites (this material is also derived from tracts).

The first two groups are fairly easy to classify and become part of the more general settlement pattern. The third group is far more complex because the reasons behind its presence in the landscape are not easily understood. There are two main phenomena that might explain off-site data: firstly in areas of highly active geomorphology such artefacts may reflect long-distance movement from sites as a result of soil movement, sites missed during tractwalking because the main scatter was between two walker lines (these would have been very small sites) or sites destroyed by erosion, alluviation or subsequent human activity; secondly they may actually reflect off-site activities (one-off events or inter-site activity). It is also important to consider the very likely possibility that material in areas near the boundaries of tractwalked areas may relate to sites located outside the investigated area and therefore not identified.

Before site and tract data are combined it is necessary to assess the difference in resolution inherent in their different scales of recording and collection. These differences involve the shape and size of the basic unit of recording, the mode of collection, and the time spent looking at each unit. The gridding of sites consists of full coverage of adjacent squares of no more than 400sq.m in extent (sometimes as small as 25sq.m). Although the material collected from the greater part of each square is only diagnostic, total collection takes place within 5sq.m of each square (vacuum areas covering between 1.25 and 20% of the square). Tracts, on the other hand, are generally sub-hectare but can range from very small (field plots traversed by a single walker) to ca. 7500sq.m (and sometimes more). Furthermore, each walker covers a strip of 2-3m, leaving a gap of 12-13m between walkers not investigated. Therefore the gridding of sites results in full coverage with more rigorous recording and collection practices which are tightly referenced spatially, whereas tractwalking covers ca. 15-20% of the study unit and material is collected less intensively than the square vacuum areas (only diagnostics are collected), and are spatially limited to the walker strips only (normally of maximum size of 200-300sq.m). Finally, the time spent over the squares is controlled whereas tractwalking is not. Multiplying tract material by 5 to approach analogous densities with site units (i.e. to cover the 80% of surface not explored) may result in a gross inflation of artefact counts, as such a measure would not take into account that some tract finds may simply constitute a few random sherds in the landscape. When comparing site and tract data these discrepancies need to be kept in mind. The underlying conclusion of the above summary is that a given number of artefacts in the tract data are likely to reflect higher densities than the same number of artefacts recovered from a gridded site.

The rest of this section discusses the exploration of the KIP tract data in order to see where low artefact densities of FN-EBA date were located in relation to FN-EBA sites. Key questions have involved the number of artefacts present, their location (on-site, near-site or off-site), and more specifically, if they are truly off-site, where might they be coming from and how possible is it to establish whether they reflect off-site activity or a destroyed site? Based on this it was possible to suggest the presence of further sites dating to the FN-EBA that were missed during tractwalking or destroyed. A more formal assessment of ceramic fall-off patterns from FN-EBA sites was carried out as part of the analysis of the FN-EBA landscape in relation to site wider activity areas and is discussed in Chapter 5.

Tract material dating to the FN-EB I is fairly scarce. A total of nine definite and two possible sherds of chert fabric were identified and individually registered. Most sherds were within 0.5 km of a definite FN-EB I site (fig. 4.28). One definite sherd was identified on the Mitata plateau and is clearly associated with FN-EB I site 085a (within 50m of the site-centre). Another three registered sherds were found on the slopes below the Mitata and Viaradika plateaux running into the valley. One of these was washing off the knoll from site 077. The second sherd was not associated with any known FN-EB I site, although it could be linked to one of the FN-EB I sites on the actual plateau. The third one was found in close proximity to site 019 on which no FN-EB I material was identified. Although only one sherd was registered, the study of the tract material revealed that there was in fact a number of FN-EB I sherds from the tracts in the vicinity of site 019 (Broodbank pers.comm.; the collection of which produced no obvious FN-EB I material). One of the two registered possible FN-EB I sherds was also found in close proximity to this site. This area is one of the most geomorphologically disturbed in the survey area, and the presence of several FN-EB I sherds from the tract data suggests that there was probably a site, somewhere in the vicinity of site 019. The other possible FN-EB I tract sherd was found down-slope from sites 125 and 186. Two definite sherds were identified close to site 089. Site 089 is clearly not the original source of the material. One was identified on the ridge above the site, and the other was found at the bottom of the ridge. It is likely that the material on site 089 and its vicinity is all derived from an original location somewhere along the ridge, which was only partly tractwalked. Another two definite sherds were identified above site 134 at Diakofti. Unless the material is coming from the un-investigated slopes and ridge above site 134 to the southwest, it is possible that the material is associated with site 134 which has an FN-EB I component and is located within 0.5 km. Another sherd in this area was found more than 1km away to the southeast of site 136, though this could also be washing from the un-investigated slopes above. All material was found in tracts with visibility less than 60% (in most cases less than 40%). On the one hand this suggests that poor visibility was not a serious obstacle in the identification of FN-EB I material and on the other hand it may also mean that not all FN-EB I sherds present in the tracts were actually located.

Besides the material identified in tracts, isolated cases of FN-EB I sherds were also identified during the collection of sites dating to later periods: eight sites revealed one or two definite sherds, whereas another five sites revealed one or two possible ones. Of these, the material identified in sites 109 and 110 (one definite and one possible) may relate to site 089. Isolated cases of definite or possible FN-EB I sherds from sites 029, 097, 117 and 118a may originate from outside the tractwalked area, as the available evidence cannot confirm the presence of a site now destroyed in any of the locations. The presence of single sherds at sites 085d, 093, 139 and 153 may be the result of site destruction. The sherds on sites 093 and 139 cannot be coming from anywhere else. There is a chance that the sherd on 085d might relate to site 004. Site 153 on the other hand is located on the edge of the geomorphologically active Livadi basin. The only concentration of two definite FN-EB I sherds was found on site 121 and could relate to the possible FN-EB I site at 124 or could be rolling down from site 125 or 186 (though they are considerably further up the slope). Finally, the sherd identified on 166 is most probably linked to site 164 which has a definite FN-EB I component (it was discussed earlier that the two sites may have formed a single settlement).

The scarcity of FN-EB I pottery compared to later EBA phases must be to a large extent the result of the poor preservation ability of the chert fabric. This means that it seldom survives in diagnostic form and therefore it would have had less chance of being picked up during fieldwalking, unlike site gridding where it would at least have been picked up in the total collection areas. Besides the material discussed above there are another 12 sites across the survey area that have possible FN-EB I material. Interestingly three of these are located in the Livadi region where the only other hint of FN-EB I presence is the one sherd from site 153. It is clearly possible that we are missing sites dating to the FN-EB I, particularly in geomorphologically active areas, such as the alluviated basin of Livadi, or the valley below the Mitata plateau. Based on above discussion, however, the presence of an additional FN-EB I site can only be suggested with any certainty in the cases of sites 019 and 089.

A more substantial amount of tract pottery dates to the EB II+ phase. A total 110 definite sherds were identified and in the majority of cases we are dealing with 1-2 sherds per tract (fig. 4.29). Areas with several definite EB II+ sites also contain most sherds. More specifically, these areas include the Mitata plateau, the Palaiopolis plain, the coastal areas of Diakofti and Avlemonas, the eastern edge of the Livadi basin, the area around sites 029 and 032 in the westernmost transect, and the small drainages south of Palaiokastro (around site 139) and Palaiopolis (around site 108). Some of the sherds could reflect destroyed sites, however, on the basis of the presence of several EB II+ sites nearby in most cases, it could also be suggested that they are the result of intensive settlement activity. The two largest concentrations of sherds were identified within EB II+ sites areas (8 sherds within the grid area of site 008 and 5 sherds within the grid area of site 029). Another relatively high density of sherds at the base of Agios Georgios prompted re-visitation which resulted in the discovery of site 125 with an EB II+ but also a FN-EB I component (neighbouring FN-EB I site 186 was also discovered during this exploration). The majority of definite sherds not located within dense EB II+ settlement areas were found very near the transect borders and may therefore indicate settlements outside the investigated area. The same holds for the definite sherds located on later period sites. A small concentration of definite sherds near the northern border on the Mitata plateau was of particular interest: the closest sites within ca. 300m are 084 (with very poor site integrity but a definite EB II+ component) and 149 (with only one definite EB II+ sherd). The sites and the tract material were scattered across a fairly flat area around the southern edges of the island's airport. The area itself appears to have been disturbed considerably by the airport's construction. It is therefore likely that the material in the vicinity reflects a destroyed site, possibly near the location of site 084, or maybe somewhere within the airport limits. The only other area where several definite EB II+ sherds were located in the tracts but cannot be directly associated with any known EB II+ site is at Pourko on the southwest edge of the survey area. It seems quite possible that there could have been a site on the ridge to the southwest, however this was not fully explored (most of it is located outside the survey area). The southwest part of the survey contains most possible EB II+ sherds (and many of the possible sites). Based on the fabric, many of these sherds could be either EBA or Second Palace (MM III-LM IA). When compared to Second Palace sites it becomes apparent that in the areas void of definite EB II+ sites at Pourko, the area south of site 029 and 032 on the western transect, and in the area just north of the

Livadi basin, all possible sherds are within the vicinity of Second Palace sites. Other smaller areas such as south of the Palaiopolis harbour and southwest of Palaiokastro produce a similar pattern. With the exception of one site in the valley below Mitata, all sherds located on alluvial areas are only possible EB II+ and these too may in fact be associated with Second Palace site also located on alluvium. Overall the probability that many EB II+ sites have been completely lost is very small.

A total of 55 definite FMin sherds were recovered from the tracts. With the exception of one tract that produced three sherds, in all other cases we are dealing with one or two sherds (fig. 4.30). The majority of sherds were located in areas of dense FMin settlement activity, i.e. mainly the coastal areas (Palaiopolis in particular). Many of the remaining sherds that cannot be associated with definite FMin sites were located near the borders (many of the possible FMin sherds also). There are only a few cases of areas inland that revealed FMin sherds not associated with FMin sites nor located near the borders (the same holds for certain sites with only one or two definite FMin sherds). Some of these may relate to definite EB II+ settlements indicating an EB III date (for example site 051 in the middle of the survey area). Although the fabric defining FMin is similar to that defining some First Palace material, there is no real association between possible FMin sherds and definite First Palace sites (MM IB-MM II). Irrespective of whether FMin sherds are close to the borders or elsewhere in the tractwalked area, the presence of several sherds inland highlights the fact that the distinction between a coastal FMin and an internal EB II+ settlement pattern is not entirely clear cut.

The exploration of the tract data has highlighted the need to address low artefact densities in conjunction with higher densities that have been defined as sites. The above discussion has drawn attention to four probable causes for the presence of artefacts in tracts: the presence of definite visible sites; the probable existence of sites just beyond the tractwalked area; the possible loss of some sites as a result of geomorphological and human activities; and finally the presence of wider activity areas that exceed immediate site vicinity and highlight the incorporation of the greater landscape in everyday life. The problem of possible site loss is more acute for the FN-EB I period, primarily as a result of the poor preservation of the archaeological material. However, some level of site destruction in areas of highly active geomorphology is possible for the subsequent EBA phases also, i.e. in the Livadi basin, the valley below the Mitata and Viaradika plateaux and the ancient harbour area at Palaiopolis.

4.5 Settlement patterns and demography on FN-EBA Kythera

This chapter has considered the chronology, size and function of the FN-EBA sites from the Kythera survey. In order to avoid generalising too crudely across the entire survey dataset, each site was assessed individually, for site formation processes and on-site and off-site material. Within this investigation, it was also necessary to examine the likelihood of undetected sites within the surveyed area through the exploration of erosional processes, material preservation and off-site data.

The discussion of relative soil erosion across the survey area, and specifically within the track-walked area, has demonstrated that sites are not only recovered from areas of low erosional activity. Although some sites may have been missed, their number does not seem significant. Furthermore, it appears that site loss is more a result of alluviation than erosion. The exploration of the tract data has confirmed this pattern by limiting possible site loss to areas of highly active geomorphology. Furthermore, the remarkable number of well-preserved FN-EBA sites suggests that Kythera does not consist of a hidden prehistoric landscape.

The investigations in this chapter constituted the first two stages in exploring FN-EBA settlement patterns on Kythera. The high spatial resolution of FN-EBA sites in Kythera enables confident characterisation of the majority of sites that have been studied so far. It is the quality of site resolution that provides the opportunity for such a detailed investigation of these sites, particularly in terms of site size. The next stage of analysis moves beyond site characterisation to investigate the relationship between sites and their immediate environment. It was discussed in Chapter 2 that the Early Bronze Age in the Aegean is marked by major changes in settlement patterns, and that these have been attributed to population increase and dramatic socio-economic developments throughout the area. The evidence for Kythera so far indicates that (with the possible/partial exception of Kastri) the FN-EBA is primarily a rural landscape. The size of Kastri (albeit still fairly small in relation to the large EBA settlements in the southern Aegean) and its coastal location are likely to indicate its importance in off-island communications. All these aspects of the FN-EBA landscape will be explored further in the next chapter.

CHAPTER 5

The Kythera dataset: The Final Neolithic and Early Bronze Age landscape

5.1 Introduction

This chapter forms the third part of the investigation of the FN-EBA landscape on the island of Kythera. The previous chapter dealt with the first two: the reliability of the distributions identified during the survey and the definition of date, size and function for each FN-EBA site. This information has been used to investigate changing settlement patterns on Kythera during the FN-EBA period and to address potential factors influencing FN-EBA settlement. The physical and climatic environment of Kythera and its resources were explored in Chapter 4 (section 4.2), providing a background against which to address the relationship between settlement and the environment. The chapter begins with an assessment of inter-site distances and ceramic fall-off from site centres, which suggests the possible size of the wider activity areas we should consider around sites in the FN-EBA phases. The sites themselves and their wider activity areas are then explored in an investigation of the potential factors influencing settlement location on the island of Kythera, a first attempt to link these with the socio-economic dynamics of the FN-EBA.

5.2. The distribution of sites in the landscape

5.2.1. Inter-site spacing

In order to explore the settlement patterns for the FN-EBA on Kythera, it is important to include a site's surroundings and not simply the exact location on which the site, i.e. any given 'dot' on the map, is situated. The extent of a site's wider activity area is likely to depend on the way in which the inhabitants interact with the landscape, for example in terms of land use strategies and resource priorities. Nearest neighbour analysis was used to suggest appropriate wider activity areas for sites in each sub-phase. Measurements were taken from the centre of each site rather than the edge of the scatter (for examples of point pattern analysis techniques cf. Hodder & Orton 1976: 30-52). Site centres were chosen for this analysis over site scatters because of the scarcity of single-phase sites for the FN-EBA (for analyses carried out on New Palace scatters from Kythera cf. Bevan 2002). This investigation is then taken a step further, with more detailed attention given to the three most populated areas within the survey: the Mitata plateau, the Palaiopolis plain and the Livadi/Pourko basins. The minimum number of sites accepted for this analysis within individual areas was five. This excluded the investigation of FN-EB I and FMin Livadi/Pourko and FMin Mitata (table 5.1).

The FN-EB I sites produced a rather incoherent pattern for the surveyed area as a whole (fig. 5.1a), although in the Palaiopolis plain sites are located at distances of 500-650m and on the Mitata plateau five out of six sites are located at distances of 250-450m. Patterns are quite incoherent for the EB II+ sites also, with the location of 29 sites at distances of 100-550m, but the remaining 20 scattered at greater distances (fig. 5.1b). In the individual areas, the Livadi/Pourko basin produced no pattern, five out of 10 sites in the Palaiopolis plain are located at distances of 300-550m and five out of 10 sites on the Mitata plateau are located at distances of 150-200m. A much higher degree of regularity was observed in the spacing of FMin sites, where 26 out of 36 sites are located at distances of 150-650m, with a clear peak at 250-300m (fig. 5.1c). The same pattern appeared again in the results from the Palaiopolis plain (fig. 5.1d). In each case, the results were tested against 1000 sets of random sites (of equal number as the sample under study) using the Kolmogorov-Smirnov 1-sample test (for each random set, the minimum distance between sites was set at 100m to account for the fact that each point represents a scatter; in the actual datasets, no distance between any two sites is less than 100m). Only for the FMin sites were the patterns statistically significant for the survey area as a whole (at $p<0.01$), but it is clear from figs. 5.1c & 5.1d that this is mainly influenced by the very regular spacing of sites in the Palaiopolis area. The short chronological span of this phase (200-250 years) means that we are more likely to be seeing a pattern of relatively contemporary sites. As a result, this 250-300m spacing between sites can be more confidently accepted as part of a realistic inter-settlement pattern.

The presence of so few FMin sites for investigation around Mitata and Livadi/Pourko is interesting in itself. It has already been mentioned that there appears to be a concentration of FMin sites in the Palaiopolis plain compared to a more spread-out pattern for EB II+ sites. Such a concentration of sites in a single area is not attested in earlier phases in the survey area and is clearly not matched in any other area either. The FMin patterns suggest demographic increase in Palaiopolis during the FMin settlement phase, irrespective of whether the influx is from outside the island or simply from other areas of Kythera. An average distance of 250-300m could be used to suggest a 150m site wider activity radius, which would equal a wider activity area of ca. 7 ha. Bevan (2002) has suggested a similar wider activity area for Neopalatial farmsteads on the island, the sizes of which tend to fit a range of 0.1-0.3 ha. All sites in Palaiopolis, with the exception of Kastri and 093, are less than 0.3 ha in size, which may explain the similarity in wider activity radius (sites 101 and 102 may have been only burials rather than settlements, but they are both on the edge of the settlement concentration and therefore their removal would not affect the overall pattern). It would stand to reason that an increase in settlement to the extent observed in Palaiopolis during this phase would have necessitated a more conscious choice of location for new settlements in specific relation to those already established. This may explain the significant regularity of site spacing here compared to the lack of significant patterns in the earlier phases. In the midst of all this, it is worth noting that the nearest FMin site to Kastri is more than 550m away, and even further away for the earlier phases under investigation (reflecting the fact that most likely we are dealing with a much larger hinterland for Kastri). The settlement is located on the coast with a probable harbour to its southwest, therefore taking into account the land covered by the sea, a 400m radius would reflect a terrain of approximately 16 ha. This suggests that the case of Kastri is far more complex than other settlements. The relationship between demography and subsistence for Kastri will be discussed in more detail later in this chapter.

5.2.2. Ceramic fall-off with distance from sites

Ceramic fall-off from sites was partly explored in Chapter 4 to provide information on the relationship between geomorphological processes and site formation. Below it is explored further to establish whether the patterns matched the results observed in the nearest neighbour analysis with regard to the extent of human activity beyond the immediate and distinct site scatter vicinities. It was shown in Chapter 4 that only a small number of sites within the survey area have potentially been lost due to erosional and depositional processes. Furthermore, in the same chapter, some first steps in assessing the relationship between tract material and sites showed that for all three phases of the FN-EBA tract material tended to derive from areas with sites of the same date, whereas large areas with a distinct lack of sites were also generally void of tract pottery. In addition, it is further interesting to see the extent to which fall-off of pottery with distance from sites produced a finer resolution for this relationship between tract material and site location. The presence of later periods on many FN-EBA sites meant that it was not possible to explore ceramic fall off patterns within the actual site assemblages.

The FN-EBA tract pottery and site distribution maps were combined to calculate the distances between each tract sherd and the nearest site of the same date (figs. 5.2-5.3, 5.5-5.6 & 5.8-5.9). This was taken a step further by calculating the number of sherds per 100m walked as a way of adjusting for relative tract size (figs. 5.4, 5.7 & 5.10). Two differences were observed, the first of which relates to all three phases. In each case, the 0-50m and 50-100m groups are more pronounced in the second graphs, emphasising the fall-off curve. This exaggeration simply reflects the fact that four times more area can be paced within a 100m radius compared to within a 50m radius, and 2.25 times more area can be paced within a 150m radius compared to within a 100m radius. Therefore, the second graph correctly exaggerates the fall-off curve. The exaggeration of the 2700-2750m group for the EB II+ sites in fig. 5.7 reflects the disproportionate effect of one sherd found in a bin of small sample size. The vast majority of island surface within the 2700-2750m group is located outside the tractwalked area, which is hardly surprising if one considers that sites are scattered across the tractwalked area. As was noted just above, an increase in radius results in an increase in potential paced area; however, as one moves towards the edge of the tractwalked area, the paced area decreases, and this can result in a misleading exaggeration of raw counts per 100m paced, as we have seen here. With the exception of this anomaly, the overall patterns in figures 5.4, 5.7 & 5.10 reflect the patterns in figures 5.3, 5.6 & 5.9, and further highlight the fall-off curves (especially in the case of EB II+ sites).

There was relatively little diagnostic FN-EB I pottery found during tractwalking, but despite the small sample, the graph shows that all but one sherd are located within 450m of FN-EB I site centres. Indeed, the single sherd beyond 450m is located within 150m of the edge of the tractwalked area and therefore might be associated with another, unidentified site outside. The EB II+ diagnostic pottery is the largest of the three assemblages and appears to decrease gradually in frequency as the distance from EB II+ site centres increases. Material appears to reduce considerably at 400-450m and it is worth noting that half the sherds (55 out of the 110) are located within 150m of the site centres. The FMin pottery produces a less tidy pattern than the EB II+, but a distinct decrease remains, and at 450-500m ca. 40% of sherds (22 out of 55) are located within 150m of the site centres. The inclusion of the possible pottery for all three phases does not alter this picture greatly.

What is clear is the fact that if we were to derive a site's wider activity limits from ceramic fall-off from sites, they would be very different from those suggested by site spacing. Although it is reasonable to assume that off-site pottery reflects human activity (contemporary with the associated sites) and should be able to provide insight into the extent of this activity beyond the immediate site, it is also important to remember that it is intrinsically linked with the area's geomorphology and subsequent human activity (cf. Chapter 4).

The variation in results produced by nearest neighbour analysis and ceramic fall-off for the FN-EBA indicates that the complexity of processes affecting off-site material would not allow one to suggest any accurate site wider activity areas from ceramic fall-off. However, the ceramic fall-off results do draw attention to some interesting points. Despite the slightly messier pattern for EB II+ sites and the scarcity of material for FN-EB I, there appears to be a threshold of 400-500 m, at which distance tract pottery decreases significantly for all three phases, creating an overall FN-EBA pattern. It is possible that different levels of activity took place at different distances from a site (e.g. some areas designated for cultivation and some for keeping or grazing livestock). Furthermore, the small amount of pottery located beyond the 400-500m threshold that is not near the edges of the tractwalked area (which could be associated with unknown sites outside the boundaries) may reflect movement or activities between settlements. The material within the 400-500m threshold may reflect site wider activity areas, but it may also reflect erosion patterns of sites and their wider activity areas during and after their abandonment.

Based on the observations from the nearest neighbour analysis and the ceramic fall-off patterns it was decided to suggest wider activity areas based on the former. The more secure 150m radius wider activity area identified for the FMin sites has been used here as a core wider activity area for all three phases. This is not meant to be in any way deterministic; it is acknowledged that site wider activity areas are likely to have been more fluid than the rigid circular areas suggested here. An important goal of this research is to explore the landscapes around site scatters, because it is likely that important agricultural and domestic activities occurred here. To do so quantitatively, it is necessary to adopt a crude form of catchment analysis while remaining wise to the limitations of such a technique. Site spacing and ceramic fall-off do not agree entirely but encourage the use of a radius of ca. 150m. The exploration of wider activity areas aims to give a better impression of site location, rather than merely looking at the exact point where a surface scatter was found, which might conceivably have more to do with where people chose to build dwellings.

5.3. FN-EBA sites and the resources on Kythera

5.3.1. Analysing the data

This section focuses specifically on correlations between site locations and a series of environmental variables in an attempt to understand the factors influencing settlement location on Kythera. The purpose of these analyses is to explore the relationship between these correlations and actual strategies followed during the FN-EBA and how these might vary through time, and potentially in different parts of the island. Ten variables were chosen to be investigated relating to the island's *geomorphological landscape*, which 'can be appreciated purely in terms of its measurable surface form (geomorphometric), the materials that make up the surface and sub-surface (material), and the processes that give rise to the geomorphometric and material characteristics (processes)' (Wood 1996: Chapter 1.2). The variables can be roughly divided into four groups, based on the types of data they involve and/or the questions they answer. The first category consists of the **landform metrics**, variables that are either actual xyz coordinates (*altitude* z) or which can be directly calculated from xyz coordinates and their rate of change (*slope, aspect, surface curvature* and *fractal dimensions*). All five variables were extracted from the DEM (slope and aspect in *TauDEM* using the D^{∞} algorithm (cf. Chapter 4) and surface curvature and fractal dimensions in *Landserf* (Wood 1996), which allows the calculation of surface parameters by applying a quadratic model to a user-specified number of neighbouring cells of the DEM; cf. infra). **Geology** constitutes the second category, which was added to the GIS as a separate polygon dataset. The geological information was derived from a fairly coarse-scale, 1:50000 geological map of the whole island (produced by IGME) and was compared for general accuracy with higher resolution geological maps of the three focus areas within the survey, Mitata, Palaiopolis and Livadi-Pourko, which are the results of geoarchaeological research by C. Frederick and N. Krachtopoulou as part of KIP. The third category includes all variables that relate to **island hydrology**. *Fresh water sources* were derived from hydrological investigations carried out on the island in the last 25 years (e.g. Gertsos 1996; Pagounis 1981; 1982a; 1982b; Pagounis & Gertsos 1984). *Watersheds* and *flow accumulation* patterns were extracted from the

DEM (in *CRWR-Prepro* (Olivera *et al.* 1998) and *TauDEM* respectively). The final group deals with the island's **coastal proximity** and maritime access.

The 10x10m site-centre grid cells only were explored against altitude, coastal proximity, fresh water proximity and watersheds, because in all these cases the focus of attention was the actual settlement. Site wider activity areas only were explored against slope and geology, because in these cases the main focus was the merit of the area for agricultural practices. In the cases of aspect, surface curvature, fractal dimensions and flow accumulation, both site-centres and wider activity areas were investigated. Measurements of the wider activity areas included every 10x10m grid cell within them, which was attributed with a specific value (e.g. slope in degrees, geological bedrock category etc).

Two techniques were used to test for statistical significance in the data: chi-squared and Kolmogorov-Smirnov 1-sample tests. The suitability of these tests lies in the fact that they do not assume normally distributed populations for nominal and greater than nominal scale variables respectively (Conolly & Lake 2006: 130), and the reason for using the 1-sample versions was their appropriateness in testing a single dataset against a specified background population (Kvamme 1990: 369; Shennan 1997: 104). The former was used in all cases involving categorical data (aspect and geology), whereas the latter was used for continuous data (altitude, slope, surface curvature, coastal proximity, fresh water proximity, watersheds and flow accumulation). The accepted confidence level for all tests was set to 95% ($p < 0.05$). The chi-squared 1-sample test restricts to a maximum of eight categories and to a minimum expected value of 5 individuals (and never fewer than 1) in at least 80% of the categories. As a result, it was not always possible to explore the smaller datasets statistically (cf. infra). In the case of samples with up to 34 individuals, the Maximum Difference value (Dmax) for the Kolmogorov-Smirnov 1-sample test was taken from a statistical table, whereas in the case of samples with 35 or more individuals, the value was calculated by using a formula (Siegel & Castellan 1988). Theoretically, very small samples can be tested in this way (as small as n=1) However, tests on samples of fewer than five sites were carried out to see whether they fitted the general pattern and they were not considered to produce meaningful patterns on their own. It should be noted here that in what follows, the term 'significant' only refers to patterns that are validated statistically.

The samples were tested against the rest of the tractwalked area (not the whole survey area), which has been systematically sampled and is thought to contain few if any other surviving sites. Although the steepest slopes and the gorges were not systematically tractwalked, some were explored more extensively and produced no material, and they have therefore been included in the background population, but this represents only a very limited additional area. When investigating both site-centres and site wider activity areas, site data was tested against non-site data, i.e. the remaining tractwalked area in each case. The FN-EBA sites were tested by phase (major, minor and small component sites). Statistical analyses were carried out for the tractwalked area as a whole, and then for the special interest areas of Mitata, Palaiopolis and Livadi/Pourko, and also for the remaining tractwalked area outside the areas of special interest (henceforth KIP transects). This was aimed at determining the relationship between settlement and environment at a finer resolution, though in some areas for some periods the site numbers were insufficient for any analysis. The reason for looking at the three special interest areas was the fact that they are agriculturally favoured zones today and there appears to have been a concentration of settlement there for at least some of the FN-EBA phases. The KIP transects have more sites than each of the special interest areas, but these are scattered across a much larger and more broken up area.

5.3.2. Landform metrics

Altitude was investigated for the site centres within the whole KIP area only, since within the Mitata, Palaiopolis and Livadi-Pourko areas all sites are at broadly similar altitudes (fig. 5.11). Altitude values were grouped into 50m ranges, and the Kolmogorov-Smirnov 1-sample test was used to test the site centre cells against the remaining tractwalked area. The analyses highlighted a significant difference in the FMin sites only. The results suggest that the there is a preference for lower altitudes in this phase: 67% of sites have a 0-100m height above sea-level, which is 43% more sites than expected. The island is fairly low overall (the highest point within the tractwalked area is under 500m), and it seems unlikely that subsistence strategies would have been affected by any altitude changes in this case. As will be shown below, FMin sites tend to be located coastally, which also coincides with lower altitudes, therefore it seems more likely that the significance in altitude is caused by significance in a second parameter. Confounding or interacting relationships between significant variables are discussed in section 5.4.

Aspect was investigated for site-centres and wider activity areas because of the possibility that it may provide information on the decision to shelter settlements as well as potential agricultural areas (fig. 5.12). Aspect values were grouped into north and south ranges and also north, east, south and west ranges in an attempt to achieve higher resolution. The small size of the individual area datasets did not allow them to be tested (by chi-squared) when grouped into four categories; and when grouped into two categories, the only individual areas that could be tested were FMin Palaiopolis and the KIP transects, for all three phases. For the KIP transects, analyses highlighted a significant difference only for the FMin sites (not the wider activity areas), where 11 out of 13 sites (85%) were found to be south-facing.

Slope was investigated for the wider activity areas rather than the site centres alone, in an attempt to explore possible links with the types of agricultural practices being employed (fig. 5.13). Slope values were grouped into 1° ranges and the wider activity areas were tested against the remaining tractwalked area. The analyses produced no significant patterns, although the total EB II+ dataset warrants some further evaluation. There are three EB II+ sites that have very little gentle slope in their wider activity areas: sites 008, 020 and 139. With the removal of these sites from the tests the EB II+ pattern becomes significant, i.e. at the point of maximum difference between observed and expected, 76% of the total wider activity areas have 0-10° slope, against an expected 56% (fig. 5.14). In the four areas analysed individually, the percentage of sites with average slope wider activity of 0-13° ranges between 78% and 100% (figs. 5.15a-c). Despite the fact that no individual area is validated statistically, it is possible that the lack of statistical significance is a result of the small size of the data samples.

Sites and wider activity areas were analysed in an attempt to assess their fractal dimensions, i.e. the spatial variation in roughness within the areas in question. However, no significant patterns emerged for any of the phases (fig. 5.16). Surface curvature was investigated for site-centres and wider activity areas. The ability to explore cell neighbourhoods at a range of neighbourhood scales meant that terrain ruggedness could be investigated more sensitively. In this case, cross-sectional curvature was established through the measurement of the quadratic plane of the slope normal and perpendicular aspect direction (Wood 1996: Chapter 4.2.2). Cells with negative values represent concave surfaces, such as channels, and cells with positive values represent convex surfaces such as ridges or hills. The size of the cell neighbourhood was set at 3x3, 25x25, 49x49, 75x75 and 99x99 cells (fig. 5.17). Curvature values in each case were grouped into 0.2 ranges, and the Kolmogorov-Smirnov 1-sample test was used to test the site-centres against the remaining tractwalked area. Values between -0.1 and 0.1 were binned together as they all reflect very low levels of curved surface (both convex and concave). Significant patterns emerged only for the site-centres, not the wider activity areas. The analyses highlighted a significant difference only in the case of the 25x25 cell neighbourhood, but for all three phases. Individual area testing produced significant patterns for Mitata EB II+, Palaiopolis EB II+ and FMin, and KIP transects all phases. In all cases the statistical testing has indicated avoidance of topographic features, such as channels or gorges or even planar surfaces, over an area of 6.25 ha. Against an expected 46% of sites for all phases, no FN-EB I sites (0%) are located on such surfaces, three out of 49 EB II+ sites (6%) and four out of 36 FMin sites (11%). It is striking, however, that although in all phases the largest concentration of sites is found on slightly curved terrain with -0.1-0.1 values (44%, 59% and 47% respectively), for the FN-EB I and FMin groups this category also has significantly fewer sites than expected. The fact that almost 40% of the total tractwalked area fits into this category may be exaggerating how low the site numbers in this category actually are. The histograms in figures 5.18a-c reflect this quite clearly. The number of sites seems to decrease on either side of this peak, more abruptly perhaps in the 'negative' direction, particularly for the FN-EB I. Looking at both observations together, it seems most likely that within the given scale, settlements tend to be located on fairly neutral/flat (very low negative or positive curvature) or medium-low convex relief. Surface curvature was further calculated for 19x19, 21x21, 23x23, 27x27, 29x29 and 31x31 cell neighbourhoods to see whether the above pattern is particular to the 25x25 cell neighbourhood, or whether it changes suddenly with small changes in scale. The results showed no significant pattern when the window was increased, though surface curvature continued to be significant for the FN-EB I phase as the window became smaller; however, a substantial weakening in the relationship was apparent. This continuous pattern across a number of successive 'window sizes' perhaps highlights the fact that there are thresholds at which changes in scale will be meaningful to populations and therefore influence their interaction with the landscape. It is also worth noting that a 25x25 window is equivalent to an area of 6.25 ha, which is only a little less than that designated for the sites' wider activity areas.

5.3.3. Geology

Geology was investigated for site wider activity areas (fig. 5.19). The chi-square test was used to test these wider activity areas against the rest of the tractwalked area. The small size of the individual area datasets made it impossible to test them for any sub-phase. Although the maps are not soil maps, but ostensibly bedrock maps with information on the location of alluvial soils, they were used bearing in mind the soils produced from each type of bedrock present and their particular land use properties.

A total of 12 IGME geological categories fall into the tractwalked area:

- Neogene marl limestone
- Neogene regressive conglomerates
- Neogene transgressive conglomerates
- Neogene (undivided)
- Olonos Pindos Cretaceous limestone (undivided)
- Olonos Pindos Upper Jurassic chert shales
- Quaternary (undivided)
- Tripolitza Cretaceous limestone (undivided)
- Tripolitza Eocene flysch
- Tripolitza Eocene limestone
- Tripolitza Triassic – Middle Jurassic limestone
- Tripolitza Upper Jurassic limestone

In order to keep to the chi-square test restrictions (cf. section 5.3.1), the 12 categories had to be grouped into two larger categories. As the Neogene marl soils seem at first glance to be an agriculturally favoured geological group on the island and are found in abundance across the central and south parts of Kythera, the categories used for this analysis were 'Neogene marl limestone' and 'remaining geological categories', to see whether there was any preference for the former. The results indicated a preference for marl for the EB II+ and FMin sites, 26 EB II+ sites (53%) against an expected 19 sites, and 24 FMin sites (67%) against an expected 14 sites. Statistical testing of the remaining harder limestones (excluding marl) against the non-limestone geological groups for EB II+ sites produced no further significant patterns. Despite the fact that there is no significant EB II+ preference for settlement on the harder limestones, it is worth noting that 15 sites are located on predominantly harder limestone and only eight on the remaining geological categories (figs. 5.20a-c). The lack of significance could partly be due to the fact that there is relatively little tractwalked area consisting of the non-limestone groups, thus exaggerating the site numbers on non-limestone in the analysis. In the case of the FMin sites, it appears that the remaining site wider activity area is spread across the remaining geological categories fairly evenly. The above results were reiterated when the IGME map was compared with the finer resolution (1:5000) geoarchaeological maps (drawn up by C. Frederick and N. Krahtopoulou as part of KIP).

5.3.4. Island hydrology

Hydrological variables have been explored because they can play an important role for communities in terms of farming strategies and living conditions. On the one hand, drainage systems affect soil moisture and natural water sources, such as streams and springs, can be vital for households and livestock needs or even emergency irrigation. On the other hand, floods can destroy settlements or crops. At a first glance, variables such as order of nearest stream and horizontal distance to water sources are not easily integrated into this analysis because many of the streambeds on Kythera are not perennial, but they tend to serve as outlets during winter floods, and also because the multitude of springs on the island are not completely mapped. The nature of streams on the island excludes a meaningful investigation of their proximity to settlements, but an attempt was made here to assess the importance of natural springs, bearing in mind the problems that can arise. Also investigated were water runoff and the location of sites on the island with regard to watersheds.

Proximity to fresh sources was investigated for the site centres only. With the exception of Kastri, which has a modern well 70m from the site centre, in all other cases fresh water sources are beyond the defined wider activity areas. Distances were binned into 200m categories and site centre cells were tested against the remaining tractwalked area (figs. 5.21a-c). The analyses highlighted a significant difference for EB II+ sites for the whole area, and individually for FN-EB I Palaiopolis. The results suggest that the there is a preference for site location within 1km of fresh water sources (26 sites, or 53% against an expected 33%). In fact all 49 EB II+ sites are located within 3.5km of fresh water sources. FN-EB I Palaiopolis sees the location of four out of five sites within 400m of wells (80% against an expected 20%).

The hydrology of the island was also investigated in terms of water runoff and drainage systems. Flow directions and accumulation, stream networks and watersheds were extracted from the DEM. The flow accumulation map used here was the one created for the soil loss analyses in Chapter 4 (fig. 5.22). The value of each cell represents the number of cells that 'pour into it'. In the first instance, site centres were explored in relation to flow accumulation. A Kolmogorov-Smirnov 1-sample test was used to test the site centre cells against the remaining tractwalked area and this analysis highlighted a significant difference only for the FMin sites, suggesting a preference for site location in places with less than 0.1 ha (10 100sq.m cells or less) draining through them (33 out of 36 sites – 92% against an expected 63%). More specifically, within the FMin group it is the Palaiopolis sites that bring about this result (all sites are located on cells with less than 0.1 ha pouring into them – 100% against an expected 66%). It should be noted, however, that over 80% of sites for both FN-EB I and EB II+ were found to be located on cells with less than 0.1 ha pouring into them (including all Mitata and Palaiopolis sites in each case), though the patterns were not statistically significant. Flow accumulation was explored further for the wider activity areas, but no significant patterns emerged. It is worth noting, however, that in all three cases, over 67% of the total wider activity area had less than 0.1 ha draining into it (i.e. into each 100sq.m grid cell).

Another approach which highlights a similar pattern is the consideration of watersheds (fig. 5.23). This involved the creation of a stream network which was based on the premise that a cell is part of a stream if a minimum number of cells pour into it. This minimum cell number threshold is user-specified, allowing the investigation of this issue at a range of scales. The cells where two or more streams meet are defined as outlet points, and watersheds constitute the areas that drain through these points (Olivera *et al.* 1998). In this case the threshold was set to 700 cells, as it is fairly close to the site wider activity area as defined by nearest neighbour analysis. The distances between sites in each FN-EBA phase and the watershed edges were calculated in order to explore their spatial relationship (for the site centres only). Ideally it would have been useful to be able to measure from the edge of the site scatters, but as scatter extents are not available for all FN-EBA sites, measurements were taken from the site centres. Distances were found to vary from 1m to 204m, so they were binned into 10m categories and the Kolmogorov-Smirnov 1-sample test was used to test the site centre cells against the remaining tractwalked area. The analyses highlighted a significant difference in all three phases and individually for EBII+/FMin Mitata and Palaiopolis and FMin KIP transects. The results suggest that there is a preference for site location within 50m of watershed boundaries for FN-EB I (23 sites – 85% against an expected 52%), 70m for EB II+ (43 sites – 88% against an expected 68%), and 50m for FMin (29 sites – 81% against an expected 52%). In all phases it would appear that sites are preferentially located closer to watershed boundaries, i.e. in areas with relatively low amounts of water draining through them (figs. 5.24a-c).

5.3.5. Coastal proximity

Coastal proximity was investigated for the site centres within the whole KIP area only, since the Mitata, Palaiopolis and Livadi-Pourko sites will be at similar distances in each case. Distance values were grouped into 1km ranges, and the

Kolmogorov-Smirnov 1-sample test was used to test the site centre cells against the remaining tractwalked area. The analyses highlighted a significant difference for the FMin sites only. The results suggest that there is a preference for site location within 3 km of the coast (29 out of 36 sites - 81%). The maximum difference is at 1-2 km (27 sites - 39% more than expected.

5.4. Interpreting the results from the data analysis

The results of the above analyses have produced some interesting insights into the relationship between settlements and their surroundings. Table 5.2 presents a summary of the results from the significance testing applied to all environmental variables. There are several points worth making here. Firstly, although the analyses have confirmed the importance of certain parameters, a lack of significance in some phases, or for the FN-EBA as a whole, need not imply a lack of importance, but possibly simply an inability to confirm it statistically. This investigation has sought to identify patterns for the FN-EBA as a whole, and it is not able to pick out all patterns with the same confidence statistically. If anything, significant patterns are more likely to be present in cases where preference for a given variable is integrated into the social/economic structure of a settlement network, i.e. when strategies are more universally embraced. Secondly, the thresholds identified in the statistical analyses based on the maximum difference need not have been as sharp in reality. After all, the quantifications achieved in a GIS cannot be so mechanically implemented by real human actors when in an actual landscape. A preference for certain features may be influencing settlement location, but there is bound to be deviation from the ideal, depending on the perceptions and predictions of individual settlers. The earlier discussion on surface curvature indicates this, where the majority of sites are on low to medium positive relief, though there are a few exceptions to the general tendency. Thirdly, the relatively crude demarcation of wider activity areas may explain why some sites do not fit into the overall pattern. Finally, the reasons behind settlement choice will be a combination of subsistence and social strategies, and, as will be discussed below in more detail, the extent to which a settlement conforms to a more widely accepted strategy is likely to depend on the extent to which it is integrated into the overall settlement network, and the inhabitants' awareness and knowledge of the potential benefits of such strategies.

What has become apparent over the process of the above analyses is that some of the environmental variables are interdependent. The most obvious case seems to be that of coastal proximity and altitude. The question that needs to be answered ideally is whether such variables are working in combination (interaction) or whether only one of them is significant but their relationship makes it difficult to distinguish between the two (one is confounding the other). Each variable was plotted in relation to all other variables in order to explore their level of interdependence (fig. 5.25); the only variable that could not be plotted in such a way was geology, because its values are categorical, not continuous). Each dot within the scatter-gram reflects a separate cell from the GIS raster maps and the X and Y axes represent the values of two variables. In most cases it is clear that no relationship exists (for example in the aspect/slope plot the cells reflect an even distribution of aspect values across the full range of slope values, which tend to range between 0 and ca. 25° as determined by this particular landscape). The plots indicate that altitude, costal proximity and distance to fresh water sources are interdependent with one another. The messy patterns that are produced in the plots containing the distance to fresh water sources variable may partly be the result of the presence of only a few such sources, distributed unevenly across the landscape. Furthermore, the altitude/coastal proximity plot highlights that altitude tends to increase with distance from the coast. The cloud of data points in the area of high altitude/short distance from the coast is probably produced by the mountain of Agios Georgios above Avlemonas and Diakofti, a substantial landform that drops rapidly to the sea. Given this possible confounding relationship between the two variables and in order to refine any possible causal relationship, the KIP survey area was divided into 0-100m and 100+m altitude areas. Sites were tested against coastal proximity in both areas, but this time no significant patterns emerged. The fact that there is very little low altitude in areas at great distances from the coast may mean that any such refinement of the analysis is bound to produce non-significant results. However, it seems improbable that such small-scale variations in altitude as observed on Kythera would be of any importance and therefore it is more likely that the significant variable in this case is coastal proximity.

In order to assess the possibility of a relationship between geology and slope, the survey area was divided by the geological categories used in section 5.3.3 (Neogene marl limestone and remaining geological categories). The cell frequency of each of these was then plotted for each 1° slope category (fig. 5.26). Based on this division, geology was weighted by slope and then tested again for significance. As in the case of altitude and coastal proximity, no significant patterns emerged. This suggests that the variables are sufficiently strongly correlated in both cases to mean that priority of one or the other cannot be picked out statistically at this stage. In the case of geology and slope, some interaction seems likely, with both working in tandem to influence settlement location, though this should have been picked up in the hybrid test discussed above. It is therefore not clear whether it is both or just one of the two variables that communities were focusing on, but irrespective of this, both would have had an impact of the subsistence strategies employed.

5.4.1. FN-EB I

The environmental variables that can be confirmed statistically as influential in the FN-EB I phase are surface curvature and watershed boundaries. Although they have been discussed above in different sections (landform metrics and island hydrology respectively) and reflect different patterns, they are to a certain extent related. Surface curvature is used to identify, integrate and quantify the six basic topographic features in a landscape at given scales: ridges, peaks, channels, pits, passes and planar surfaces. The way in which these interrelate will affect the stream and drainage networks and therefore the watersheds (streams should correspond with areas of negative surface curvature). Both variables have been found to be significant at similar scales for all three phases. Bevan has pointed out that such small-scale drainage areas tend to be quite frequent in the Kythera landscape (Bevan 2002: 243), and the observed significance suggests that both variables remain important throughout the FN-EBA. Out of the 27 FN-EB I sites 23 are simultaneously on low/medium relief and close to watershed boundaries. The only notable exception is site 008, which is located on a very prominent ridge (a highly convex surface). This site continues to be occupied or at least is re-occupied in the EB II (and possibly EB III). Its location is intriguing; on the one hand, it is the site with the steepest slope within its wider activity area for all phases and, on the other, the ridge is highly defensible on three sides, with only the north side opening out onto the Mitata plateau. It is located on a sharp watershed boundary (the ridge), which fits in with the patterns for the FN-EB I overall.

Despite the fact that most environmental factors cannot be confirmed statistically for FN-EB I, it is worth discussing slope and geology, as they do have significant impact on the subsistence of small agricultural communities. 72% of wider activity areas are on 13° or less. The sites that stand out for having extremely little gentle slope are 008, 020, 089 and 174 (less than 30% of area on 13° or less slope), of which 020 is possibly the only one that has little in close proximity beyond the defined wider activity area. Two of these sites are abandoned before EB II (089 and 174), which is the phase during which slope becomes a significant consideration in settlement location; it is possible that due to the lack of terracing, erosion may have been one of the reasons for abandonment (however note that the 089 scatter is probably not *in situ*, but the material has washed down to this location, so any results for this site are likely to be inaccurate). Geology also shows similarities in that over 80% of sites are located on some form of limestone (50% on marl). Irrespective of whether there is deliberate preference for such features, it is clear that the location of the vast majority of sites would have made the most of the island's best attributes, and this will be taken into consideration in the discussion of this phase in section 5.5.

5.4.2. EB II+

Slope, surface curvature, geology, proximity to fresh water sources and watershed boundaries are statistically significant for EB II+ sites. All variables can be associated with subsistence strategies, and slope, surface curvature and watershed boundaries may also have been considered in terms of protecting settlement structures from flooding, erosion etc. The prevalence of flatter slopes within the EB II+ site wider activity areas is a good indicator that people were choosing land for agricultural practices that did not involve terracing. A study carried out on enclosed fields and different types of terraces on Kythera and their relationship to slope gradient has shown that terracing becomes important when slope gradient reaches 12-13°. This suggests that slopes of up to this steepness were usually gentle enough to allow the deployment of some agricultural practices without the need to secure the soil in place in such an elaborate way. Furthermore, aspect becomes a more important parameter only on these steeper terraced slopes (Bevan *et al.* 2003; Bevan & Conolly 2004). The fact that aspect is not statistically significant for EB II+ sites ties in with the lack of any evidence for terracing throughout the Aegean during this phase. Eighty-two percent of wider activity areas are on 13° or less. The sites that stand out for having extremely little gentle slope are 008, 020 and 139 (less than 30% of area on 13° or less slope). Site 008 has abundant land with gentler slope just beyond the assigned wider activity areas, but in the cases of sites 020 and 139 this is more limited.

Neogene marl limestone is clearly the preferred geological group for EB II+ sites. The light sandy soils that form on marl bedrock are probably the reason for this. Albeit statistically significant, only 26 out of 49 sites are located on such soils, whereas the remaining 23 are on other types of geology. The greatest concentration of Neogene marls is in the Mitata and Palaiopolis areas, and indeed most sites in these areas are located on marls. If we consider geology in combination with slope, only site 139 is located on non-marl areas and has a wider activity area with slope mostly over 13°. A comparison of the IGME geology map and KIP's geoarchaeological map indicates that sites 085a/085b on the Mitata plateau and 164/166 in Pourko are actually located on small pockets of marl that are not depicted in the more general IGME map. Other than that, in the areas of Livadi and the expanse to the southwest and south of Palaiokastro, where marl limestone has so far not been located, settlers would have had to choose between the harder limestone and the other geological groups available.

Fresh water sources also appear to be important for EB II+ sites. Within the survey boundaries, the most likely areas to find springs are the higher levels of the Perati and Peristeriona Gorges and their related smaller drainages (e.g. Gonia and Mylou Gorge), which run either side of Palaiokastro and into the Palaiopolis River. Both areas consist mainly of limestone, permeable rock formations that cause water to seep through them rather than let it flow over the surface and drain down to the sea. Springs form at contact points between the limestones and underlying impermeable rock formations (e.g. between Neogene Marl limestone and underlying non-limestone Neogene sediments at Gonia and Mylou Gorge in the Mitata area and between Olonos-Pindos limestone and the underlying flysch in the Perati Gorge; Pagounis 1981: 12, 24, 29-30). Today, there is a distinct cluster of springs along the steep slopes of the gorge dividing the Mitata and Viaradika plateaux (Mylou Gorge), and in the area of Gonia, a fold just below the Mitata plateau on its southeast edge (it is worth noting that there are far more springs in existence than those actually mapped in these areas, though perhaps of lesser flow). These are of particular interest as the Mitata area is one of the most populated by EB II+ settlements. Some of these springs have a substantial flow, and they are now used for watering small fields with garden produce for home consumption (Danamos 1992). Even if these particular springs were not in existence, it is likely that there would have been others in the vicinity in the course of the FN-EBA phases. The distances observed between FN-EBA sites and springs suggests that even if springs were located elsewhere in the general area, they would still be at fairly similar distances to the present ones and in similar environments. Therefore it is still worth exploring their relationship to FN-EBA settlement location.

The investigation of fresh water sources has indicated an overall preference for settlement location in areas where access to fresh water is more likely, particularly for EB II+ settlements. It is clear that the three areas of primary interest, Mitata, Livadi and Palaiopolis, are all characterised by the presence of springs or wells in the vicinity. The main difference between the springs in the Mitata area and the wells in areas such as Palaiopolis and Diakofti is that the latter are modern. It is still worth investigating them, as they reflect locations where water tends to collect and could therefore be exploited, whether through the deliberate opening up of wells or simply through their natural opening (e.g. if the roof of an underground reservoir falls in). Within the survey boundaries they are located mainly in areas of flysch as well as limestone, and particularly in channels (Pagounis 1981: 25; Pagounis & Gertsos 1984). It is interesting to note that in every location where there are wells today within the tractwalked area, there are also EB II+ sites (e.g. Livadi, Palaiopolis and Diakofti), though the distances to these sources vary. 26 sites are located within 1km of fresh water. It should be noted, however, that much of the water at Diakofti is brackish. The area that stands out for the lack of accessible water is the system of small valleys south of Palaiopolis, where 108 and 109 are located. The only other area that seems to be void of natural water sources today is Pourko. The geology on which the Pourko sites are located is mainly Olonos-Pindos limestone and Neogene sediments, but it is not clear from the reports whether this lack is simply the result of limited investigation in the area (this is not a densely inhabited area today) or actually hydrologically barren land.

Surface curvature appears to play some sort of role for EB II+ settlements, as in the case of those in FN-EB I. When considering an area of ca. 7ha, EB II+ sites are generally located on low/medium relief, mainly flat areas, or small ridges and hills (for this phase also the site that stands out is 008, with its location on a highly prominent ridge on the Mitata plateau). The only sites that really stand out as being located in channel areas are 118 in Palaiopolis and particularly 109 in the small valley systems to the south of Palaiokastro (the site integrity of both has suffered as a result). In terms of watershed boundaries, only six sites are more than 70m away from one in this phase, and two of these are within 80m. Sites 088, 109, 118 and 161 are more than 100m away. The location of sites on the edges of watersheds may indicate an attempt to make use of the moisture that is captured in the soil and drains through the shallower parts of these basins.

5.4.3. FMin

The number of significant variables for the FMin sites is greater than either of the preceding periods; geology, surface curvature, watersheds, flow accumulation, coastal proximity and – for the KIP transects only – aspect. The importance of aspect for the KIP transects is quite odd: if we were seeing the first possible hints of terracing (which is not confirmed archaeologically for this phase), one would expect that the 11 south-facing sites might be preferentially located on slopes above 12-13°, which is not the case. In fact only three out of the 11 sites have substantial steep slope within their wider activity area (081, 111 – the MM III-LM I peak sanctuary – and 139). The area covered by what has been termed KIP transects is a widely broken up area, containing what one might regard as the more discrete sites, or at least a number of smaller concentrations of sites (e.g. the drainage systems south of Palaiokastro or Diakofti). Patterns in this case need to be considered with greater caution. It is not clear why the sites in these particular areas seem to have deliberately chosen south-facing locations.

As with FN-EB I and EB II+ settlements, surface curvature and proximity to watershed boundaries remain important in the same way for FMin settlements. The sites that stand out for being located in channel areas are 110, 117 and 118. It is peculiar that 118 continues to be occupied or at least re-occupied, as the location shows a high potential for localised erosion and/or flooding. It may be worth considering the possibility that the EB II+ material is in fact contemporary with the FMin and that we are seeing a single possibly relatively short phase of occupation, though this cannot be confirmed (unless further study of the pottery from this site produces any more information). It is also possible that the scatter has slipped off the ridge located to its west. In terms of watershed boundaries, seven sites are more than 50m away from one in this phase, though four of these are within 80m. Sites 118, 144 and 152 stand out for being located more than 90m away. Furthermore, the significant preference for actual settlement location at points where no more than 0.1 ha flow through suggests that there is perhaps a more conscious decision to protect actual dwellings from flooding or soil erosion. The two sites which really stand out for not conforming to this pattern are 118 and 136 (7.3 ha and 1.6 ha flow through their site centres respectively).

Neogene marl limestone remains the preferred geological group for FMin settlements. 24 out of 36 sites are located primarily on marl limestone, though this may also be partly affected by the fact that the highest concentration of sites is in Palaiopolis, which mainly consists of marl limestone. Only seven FMin sites are on other types of limestone, whereas five sites are on the remaining geological categories. When examining the sites against the flow accumulation map, which highlights the drainage systems, it becomes apparent that in all phases most sites in Mitata, Palaiopolis and Livadi-Pourko are located near or just on the edges of areas with potential alluvium. This is especially clear for FMin sites, particularly at Palaiopolis where sites are neatly placed in between the shallow gullies. The exception in this case is site 144, which, as has already been mentioned, was discovered after a flood dissected a bank and stripped the stream-bed gravel in the river west of Kastri. What we may be seeing is settlements gradually exploiting the alluvium that collects in shallower channel areas for the purpose of agriculture, though it remains unclear whether they were exploiting them to the full yet through the aid of terracing.

The final variable, which seems to be one of the most important for this phase, is that of coastal proximity. Unlike the previous phases, the vast majority of sites are now found to be located near the coast, particularly in the Palaiopolis region.

In this case, as for the FN-EB I, slope is statistically insignificant. But here as well, 79% of wider activity areas are on 13° or less. The sites that stand out for having extremely little gentle slope are 008, 111 and 139 (less than 30% of area on 13° or less slope). Site 111 is not an average settlement site: although it is not clear what exactly is happening in this particular phase, it does become the MM-LM peak sanctuary of Agios Georgios. It is evident that irrespective of whether or not slope is a significant FMin variable, the contribution of gentler slopes to FMin subsistence needs to be considered.

To summarize what has been seen so far in this chapter, it would seem that certain traditions are maintained throughout the EBA, such as close proximity to watershed boundaries and location on fairly flat or low/medium positive relief. Settlement location on areas with low water flow also becomes statistically significant for FMin settlements, but as has been noted, most of the FN-EB I and EB II+ sites are also located in similar locations, though its importance could not be confirmed statistically. On a broader scale, water flow within the wider activity area of sites for all phases is also very low. Slope, geology and proximity to fresh water sources become important for EB II+ settlements, but only geology remains important for the FMin settlements, as they appear now to prioritise coastal proximity.

5.5. Subsistence strategies and demography in the FN-EBA on Kythera

Systematic exploration of the FN-EBA phases has shown a series of patterns that can vary between the three phases, leading to interesting questions as to the reasons behind these variations, which do not in all cases indicate a linear development through the period overall. This section looks at the information produced so far in this chapter and also brings in the issues discussed in Chapter 4 in terms of the nature of the sites themselves.

Most FN-EB I sites are located on the Mitata plateau, in its vicinity or in the coastal areas of Diakofti and Palaiopolis. This suggests that there may have been movement of people into the area from the north, over the plateau inland and along the eastern coast; though, interestingly, the majority of Mitata sites are on the southern tip of the plateau and not near the survey border to the north and, furthermore, the only known LN pottery on the island was found in the cave of Agia Sophia in the area of Kalamos, in the south, outside the survey area (Papatsaroucha 2000: 11-12)). Sites 089, 105, 108 and 123 are also in more southern locations, in the small valley systems and surrounding hills south of Palaiopolis, where access from the coast is inhibited by steep cliffs. The discrete settlement of 164 in the Pourko area is interesting, as it constitutes one of the few that continue throughout the FN-EBA (possibly with a number of phases of abandonment and re-occupation within this overall period). All areas continue to have settlements in the following phases, except the area around 174. In fact 19 out of the 27 FN-EB I settlements are also EB II+ settlements, which may well imply that many of them date to the later stages of FN-EB I and continue into EB II, or at least that their local environment is desirable enough to encourage settlement repeatedly or continuously.

The majority of sites are represented by surviving scatters of under 0.1 ha, suggesting a network of settlements without significant hierarchy, at least in the earlier stages of settlement in the area. Table 5.3 shows the suggested household numbers for a 600-1000sq.m range of surface areas covered by each household in FN-EB I. Sites with uncertain site size have been characterised as single household settlements. The 600-1000sq.m range was based on the assessment of household areas discussed in Chapter 2 (section 2.3.3). 550-600sq.m is the smallest known site area for EB II+ and FMin sites in the survey area. Although two FN-EB I sites have an extent of ca. 400sq.m, this tends toward the smaller end of the spectrum suggested area for FN settlements in the southern Aegean overall (Whitelaw 1991a: 207-208), and may in part be a result of the poor preservation of the chert fabric. For consistency, the range of 600-1000sq.m per household has been maintained throughout. Based on these assumptions, the (un-weighted by phase duration) FN-EB I population within the tractwalked area of Kythera may have ranged between 210 and 275 people (5-6 people per sq.km), assuming a nuclear family household of 5 people. The top value is probably too high if one considers that it is extremely unlikely that all sites were occupied simultaneously and throughout the period. Kastri stands out as the only but very marked exception, consisting of a cluster of households, maybe 15 or more by the end of the FN-EB I.

Throughout the FN-EBA, Kastri stands out (in terms of size and location) within what seems to be primarily a subsistence-based society comprising small settlements, though there is no evidence in the material culture to suggest that FN-EB I Kastri was not also an agricultural community. The harbour is thought to bestow central importance on Kastri from at least the late EB II onwards, with the introduction of populations from Crete (Broodbank 2004; Coldstream & Huxley 1972). However, Kastri itself becomes a focus much earlier than this, as indicated by its size in the FN-EB I (though it may have been less compact a settlement compared to later phases), and the reasons for this are not necessarily obvious. If Palaiopolis was attracting settlers simply because of the agricultural suitability of its plain, one might possibly expect a cluster of small 1-2 household settlements scattered across the plain, as in the case of the Mitata plateau, rather than a large settlement on the edge. The growth of Kastri so early on in the FN-EBA suggests that the presence of the harbour/beaches made the location more desirable as a nodal point for maritime interaction well before the appearance of Cretan populations on the island. Indeed, Broodbank notes that the material culture of the pre-Cretan phases is not exclusively Mainland in origin, but also has Cycladic and west-Cretan influences (Broodbank 2004: 75). It is therefore possible that we are not simply dealing with populations that arrived at some point on the island and developed in isolation, but that they continued to have links with the Peloponnese and elsewhere throughout these early phases.

If Kastri became an important focus because of its coastal location, this leads to the question regarding what impact it might have had on the settlement network in the area as a whole. The fact that besides Kastri no other site can be singled out in the FN-EB I as large enough to suggest a multi-tiered hierarchy may be attributed to the fairly limited population numbers during this phase. If we are seeing a two-tiered settlement hierarchy, with Kastri at the top level and the dispersed sub-0.2 ha settlements at the lower level, their relationship with Kastri may have varied depending on distance and accessibility. Areas such as the Palaiopolis plain and the Mitata plateau may be more integrated with Kastri, but sites such as 164 or 174 in the centre of the island, or even the sites in the small valley systems to the south of Palaiopolis, may be more independent, and therefore many decisions may have been taken at household or settlement level. Of course isolation cannot be an option with regard to the viability of individual settlements, or even the island's micro-regions, but there is enough distance between settlement clusters, and individual settlements in some cases, to allow for varying degrees of household integration with the island's wider settlement network.

The importance of so few environmental variables in the FN-EB I (statistically speaking) may partly be due to the relatively small sample size. One thing to bear in mind is the fact that the sites were explored together, but are not all contemporary and therefore strategies for survival are likely to have varied through time, depending on such factors as specific population needs, understanding of the environment and its resources, and varying climatic conditions. It is also possible that the actual FN-EB I wider activity areas were considerably more fluid than those set in these analyses, perhaps reflecting more mobile strategies, and therefore certain preferences might not be easily detectable. If the settling of this area of the island really begins in the FN-EB I phase, as seems likely, it is also possible that we are seeing more flexible experimentation in a previously unknown landscape.

The EB II phase sees a more systematic infilling of the landscape. EB II+ settlements are almost twice as numerous as their FN-EB I predecessors and there is also a substantial increase in size. A three-tiered hierarchy is suggested by the variation in EB II+ settlement size, with Kastri covering an area of 4.5 ha, a few settlements of no more than 1 ha, and ca. 40 sub-0.3 ha settlements. Although the estimated number of FN-EB I settlements may be lower than in reality because of preservation issues, the different duration between the two phases actually strengthens the pattern of EB II settlement increase. Turning to Kastri specifically, it is possible that the less compact households of FN-EB I have gradually merged into a more densely occupied and larger settlement in EB II. All three major areas within the survey limits (Palaiopolis, Mitata and Livadi/Pourko) contain at least one slightly larger EB II+ settlement (sites 164 and 166 may also constitute a single 0.5-0.6 ha community), and in fact most of these larger settlements are occupied for the first time in EB II. Table 5.4 shows the suggested household numbers for a 600-1000sq.m range of surface areas covered by each household in EB II. Based on these albeit very tentative demographic assumptions, the (un-weighted) EB II population within the tractwalked area of Kythera may have ranged between 690 and 1065 people (15-25 people per sq.km). Figure 5.27 shows potential population growth for FN-EB I and EB II at an annual growth rate of 0.1% and 0.2%. The starting figure was set at 20% of the average un-weighted FN-EB I population numbers. Constant 0.1% and 0.2% annual growth rates are probably a little too low and far too high respectively for FN-EB I. In EB II the 0.2% annual growth rate seems too low for the un-weighted population estimate. However if we consider that some of the EB II+ settlements may have dated to EB III, and furthermore that there may still have been some influx of people onto the island in EB II (this is already known to be happening at Kastri), then perhaps a 0.2% annual growth is quite reasonable.

The increase in settlement in EB II is accompanied by more clear-cut locational influences, indicating a more structured framework of subsistence strategies based on experience and a detailed knowledge of the island's natural resources. Indeed, the environmental attributes that attract most interest are those that can be directly linked to subsistence and, in some cases, the protection of actual settlements from natural disasters. All the larger settlements are located on what is perceived to be suitable land for small-scale mixed farming. The presence of large sites in all major areas may reflect a widespread settlement development across the survey area that could be taking place independently of Kastri and be the result of internal processes within the agricultural communities of each of these micro-environments. The growth of Kastri, on the other hand, may have more to do with its role as one of the island's main harbours, a growth that continues into EB III, as indicated by the extent of the FMin settlement (late EM II-MM IA), but without excluding its partial dependence on a local subsistence economy. It is striking, however, that although the survey area as a whole has more than enough agriculturally favourable land (and the majority of settlements seem to benefit from this), the immediate vicinity around Kastri cannot sustain the suggested population numbers of the settlement. If we consider the possible number of households present (45-75), the area required for the settlement should range between ca. 155 and 165 ha, assuming that a household requires ca. 3-4 ha of land for intensive cultivation (Halstead 1995b: 15). The settlement is flanked by sea to the west and south and by the Palaiopolis settlements to the north and east (starting at a distance of ca. 0.5 km). In order to sustain itself the community would either have to move beyond the Palaiopolis settlements or depend on them for subsistence. Either way this suggests a more intensive negotiation of land rights between the community of Kastri and its neighbours. This, in conjunction with the importance of the harbour, sets Kastri even further apart from the other settlements on the island.

In the first instance, the FMin assemblages suggest a slight decrease in the number and size of settlements; however, when weighted by phase duration, site numbers increase compared to EB II+ sites. Kastri expands a little more, reaching 4.9 ha. FMin settlements require more careful attention, bearing in mind that they overlap chronologically with some of the EB II+ settlements. 20 settlements in the survey area have both EB II+ and FMin material, 10 of which are located in Palaiopolis. In fact, all settlements in Palaiopolis with EB II+ material also contain FMin, suggesting that many of these are either re-occupied in EB III or do not date to the EB II at all. It is striking that the FMin settlement scatters are mainly under 0.3 ha. Outside Kastri the only two settlements larger than 0.3 ha in size are sites 110 and 093. Site 110 is quite odd, as it is the only FMin settlement in that area (the nearest site is ca. 2.8km away in the direction of Palaiopolis), and it is not clear whether either of the EB II+ settlements in the same area (108 or 109) extend into EB III. Site 093, on the other hand, is located ca. 600m northwest of Kastri and could, in fact, reflect further extension of the settlement. It is also noteworthy that within the 0-0.3 ha group, all sites ranging between 0.2 and 0.3 ha are also located in Palaiopolis. If some of the larger EB II+ settlements remain in use along with FMin settlements, it is interesting to see the balance between these, as it would appear that EB II+ settlements maintain their traditions and possibly their centrality within their respective areas, whereas FMin settlements are at a lower hierarchical level (the only exception being the small valley systems south of Palaiopolis, which contain site 110, the only medium-sized site outside Palaiopolis, as discussed above). This may also be because FMin settlements are more short-lived compared to the occupation of some EB II+ settlements from EB II. Possible burials are attested for the first time in EB III (they are reflected in the FMin assemblages) and reflect a Cretan tradition. Two of these are identified outside Palaiopolis, in the vicinity of site 004 on the Mitata plateau and at site 164 in Pourko. The two sites are the longest-lived early sites in the survey area (Broodbank & Kiriatzi n.d.b). Once again this raises the question of the interaction between Mainland and Cretan traditions: do these communities indicate the presence of Cretan people inland or are they part of the 'original' local population taking on Cretan material culture through interaction with a more Cretan-influenced coastal zone? The processes overall in EB III need to be seen within an environment of changing cultural influences, as indicated by the presence of Cretan cultural assemblages on the island.

Table 5.5 shows the suggested FMin household numbers for a 600-1000sq.m range of surface areas covered by each household in EB III. Based on these assumptions, the (un-weighted) FMin population within the tractwalked area of Kythera may have ranged between 495 and 740 people (10-15 people per sq.km). The rather fuzzy end date of occupation for the EB II+ settlements and the probable influx of further populations onto the island in EB III inhibit the understanding of demographic growth for the phase. The short duration of the period suggests that most of the sites would probably have been contemporary. However, the possible EB III date for some of the EB II+ settlements make it likely that the overall suggested population estimates are in fact too low for EB III.

FMin settlements seem to maintain most of the preferences observed in EB II+ settlements and add two further very interesting elements, which appear to be the variables least associated with subsistence: low water flow through actual settlement locations and close coastal proximity. It seems logical to assume that the lower the levels of water flowing through a location, the smaller the chances of erosion. Could we be seeing an effort on the part of FMin settlements to minimise the effects of erosion in their immediate vicinity? After all, if the MBA on Kythera sees the first evidence of terracing (Broodbank 2004: 77), suggesting the deployment of specific strategies to prevent erosion, it is possible that the avoidance of areas more susceptible to erosion in the preceding phase could reflect a growing awareness of its effects.

Close proximity to the coast really stands out here as the first clear variable determining settlement location that is not directly linked to subsistence (although fishing may be a more subsistence-oriented reason). The appearance of a highly Minoanising material culture in this part of the island has been explained with the change of external cultural influence from the Mainland to Crete through the introduction of new people and traditions onto the island (cf. supra; Branigan 198123, 32; Broodbank 2004: 73-76; Coldstream 1972b: 272-308; 1973; 1984; Huxley & Coldstream 1972: 67). This link to Crete is undoubtedly the reason for the location of FMin settlements in Palaiopolis, the vicinity of the island's best (and possibly only suitable) harbour. This could be related to the fact that the Palaiopolis plain is the primary location for the introduction of Cretan populations onto the island, and that it contains Kastri, a now Minoanised centre with access to (or control over) a good harbour with off-island links. Interaction with the local populations may also have played a decisive role, though the location of FMin material in the interior, albeit only a limited amount, suggests some form of integration. On the other hand, the plain of Palaiopolis is one of the most agriculturally favoured locations on the island, even today. It is quite possible, therefore, that Kastri is the main settlement controlling the harbour, whereas the smaller FMin settlements in Palaiopolis are simply clusters of households, mainly concerned with a subsistence based on agriculture, like most settlements in the remaining survey area and possibly the rest of the island. Kastri may indeed be an FMin/Cretan centre from the late EB II and also in EB III; however, its long-term differentiation from other settlements, even from the earlier stages of the FN-EBA, and the nature of the Kythera settlements overall, suggest that, if anything, the Mainland and Cretan populations integrated quite smoothly forming what appears to be a primarily subsistence-oriented group of communities.

If we were to extrapolate the population estimates suggested above to the rest of the island, the figures for the three phases would be 1400-1650 for FN-EB I, 4150-7000 for EB II+ (assuming they are all EB II sites) and 2800-4200 for FMin/EB III. There are two problems with these extrapolations; first of all, they do not take into consideration the fact that there is no evidence anywhere else on the island for the presence of another settlement the size of Kastri. Secondly, they are based on the assumption that population densities would have been constant across the island. If anything, this investigation has shown that there tends to be heavier concentration of settlement in areas of agriculturally favourable land, at least for EB II-EB III, and probably the most important of these are located within the tractwalked area. This issue also concerns the population figures for FMin sites, which are clearly predominant on the east coast. If the population numbers generated from the settlement size of Kastri are excluded, the extrapolated island population is 800-850 for FN-EB I, 2800-4500 for EB II and 1650-2200 for EB III (if these are further weighted by the shortest FN-EBA phase, i.e. 200 years, the FN-EB I and EB II figures are reduced further to 100-120 and 1100-1800 respectively; this is more in line with the population numbers suggested by Broodbank (2004: 75)). The above observations highlight the need to explore demography within the context of the specific settlement patterns of each area.

In order to evaluate the changes that take place between the FN-EBA phases, we should, first of all, consider the types of environmental features that the settlements of Kythera seem to focus on, as well as how these relate to the wider crop and livestock strategies that formed part of FN-EBA subsistence. Most variables explored in the above analyses affect the level of productivity for cereals, pulses, olives and vines, albeit to different extents. Slope affects the retention of water and soil preservation, though it tends to be more important for cereals and pulses than for olives and vines, the latter being able to grow on considerably steeper ground. However, it is also important to consider the likelihood that FN-EBA populations were exploiting the wild forms of both olives and grapes, whose location may have been less deliberate. Even so, the location of such wild resources is not random in the landscape, though it is generally accepted that olives can grow and survive in harsher conditions than other crops. Turning to the island's geology, marl limestone soils, which are clearly preferred within the survey area, are the most suitable soils available on Kythera for the range of crops under discussion. Marl limestones are soft, moisture-retentive calcareous soils, containing clays and organic matter (van Straaten 2002: 25), all of which are required for successful crop production. Although the remaining limestones are harder rock formations, they also share some of the marl properties to varying extents. The significance of altitude for FMin settlements has been attributed to the coastal proximity of sites rather than altitude in itself. Altitude does play a role in agriculture; above a certain elevation Mediterranean crops cannot grow, and even at levels of 600-700m crop production can be compromised. The highest elevation on Kythera is approx.

508m; therefore altitude does not become an issue in this respect (in contrast to the Methana peninsula for example, where this will be taken into consideration).

All crops under discussion are characterised as 'dry crops' because of their ability to survive and reproduce in semi-arid environments, and today they constitute a basic Mediterranean food source (where constant irrigation is not always possible). They depend mainly on rain (between October/November and April) rather than manual irrigation, and can survive spells of drought, though in such cases the actual size of the fruit will decrease. Long-term drought, frost and nutrient deficiency will weaken crops and increase the potential for disease (Isaac *et al.* 1994: 54). Despite their resistant qualities, irrigation does benefit olives, by increasing the size of the fruit and reducing production fluctuation (Isaac *et al.* 1994: 78), and in fact both olives and grape vines cultivated for domestic consumption are watered in some areas in Greece today where water is more abundant. As vital as rain is in the October-April phase, it can have disastrous effects at other times of the year, particularly when combined with high temperatures. Furthermore, both olives and vines require well-drained soils, as both crops suffer seriously in water-logged or flooded conditions (Stellatos pers.comm.), something that fits in well with the location of FN-EBA settlements near watershed boundaries and the draining of comparatively little water through their wider activity areas.

The water requirements of these crops are worth considering with regard to Kythera's fresh water sources. The springs tend to be located along the fairly steep slopes above gorges and not very near land suitable for cultivation (Gonia, below the Mitata plateau is possibly one of the exceptions to this, as the springs are located above fairly suitable land). Moreover, they only flow for small distances over the surface before seeping back into the ground because of the permeability of the limestone. It is quite clear, therefore, that springs on Kythera do not really facilitate rapid and easy field irrigation, though this may occasionally have been attempted nevertheless. Furthermore the karstic nature of these springs (the water collects at contact points between the limestone and underlying impermeable rocks forming springs on the surface when these basins overflow) means that irrespective of whether populations are deploying spring-fed or rain-fed agriculture, the water supply will still depend on the extent of annual rainfall.

There may be other reasons, therefore, for the importance of settlement proximity to fresh water sources (only attestable for EB II+ settlements): livestock, domestic use and drinking. There is a range of issues to consider with regard to the exploitation of fresh water sources involving the quality of water, the volume of flow, the precise proximity to areas where water is required, the methods of transporting it and the ways of retaining it. The water quality within the survey area is fairly good overall, and in many cases is used for the supply of settlements today. The quality of water and the volume of its flow need to be sufficient in order for people to expend the energy to reach this resource, especially for the inhabitants of settlements at slightly greater distances. Let us consider what these distances to the water sources actually imply in terms of human energy expenditure. It takes about 10 minutes to walk a kilometre. If an individual is carrying containers full of water, this is probably the maximum distance one would like to be walking, particularly if the route also involves walking uphill. The significance of the 1km threshold therefore seems quite a sensible one. No site is more than 3.5 km from a water source (this is true for all phases, but also includes wells), though 3.5 km is about half an hour's walk, which is probably too far when carrying water. The only practical way to carry water over such distances would be with the aid of a pack animal of some sort. However, it is not necessary for all domestic activities to require water to be transported to the settlement; certain activities could very well be carried out in the vicinity of the spring. Livestock can also be taken to the actual source rather than the other way round, but that would depend on the type of livestock and the accessibility of the source (for example, the location of water sources on flatter ground may be preferred to those on steep slopes). Ephemeral reservoirs created by flooding would also be invaluable for livestock. At any rate, since there are many settlements that are more than 1 km away from such water sources, and the importance of these can only be confirmed for EB II+ settlements, we also need to consider the importance of rain water for domestic use and drinking. As with cultivation, it is clear that the dependence of natural water sources on rain water means that extensive droughts would inevitably have affected both livestock and domestic consumption. Annual precipitation today tends to range between 500 and 600mm, though greater extremes are known (based on measurements for the years 1960-1981; Pagounis & Gertsos 1984: Table 2). This variability from year to year is precisely why buffering mechanisms are so important in subsistence oriented-communities and this seems to be the case for FN-EBA communities on Kythera also.

The environment of Kythera overall, at least within the area under study, cannot be described as truly marginal in terms of soils, terrain or rainfall levels, although interannual variation would have seriously affected local populations, just as any other similar environment in the Aegean. The spatial isolation of some settlements, which is observed mainly in the FN-EBA, appears to have been a matter of a social choice, the rationale of which is unclear at present, but which does not correspond with environmental marginality. The most spatially isolated individual settlements in the FN-EB I, for example, are sites 164 and 174, both of which are located in areas of substantial agricultural potential. The movement of populations into the area during the FN, at a time when population increase is thought to have driven settlement into new areas of increased marginality in the Aegean as a whole, does not really match what we see on Kythera. Particularly if populations were arriving into the survey area from the north of the island, then the movement took place from less to more agriculturally favoured areas and not the other way round. If the observed populations came in from the Mainland, then it is possible that Kythera was slightly more marginal than their place of origin. What is clear, however, is that irrespective of the extent to which populations were aware of the potential of the area's resources at different phases of the FN-EBA, the majority of settlements throughout the period probably benefited from their location on the most suitable soils and slopes available, maximising their chances of successful subsistence. The fact that not all settlements are located within areas of maximum agricultural potential can be for a variety of reasons. For one thing, the extent to which settlements are integrated into a settlement network will affect their choices and therefore the homogeneity of the overall pattern. The targeting of specific types of environment by a substantial proportion of settlements in an area can be the result of universal awareness of a set of subsistence strategies, or it can be the result of conforming to a collective decision. Within the area under study, it is obvious that less suitable locations for settlement could not have been chosen because of the lack of something better. There may have been other variables prioritised over the need to exploit the immediate settlement vicinity agriculturally, such as social connectivity and/or other kinship links.

If we consider the FN-EBA subsistence strategies on Kythera within the wider framework of the Aegean, it would seem that there is an emphasis on more small-scale mixed farming than on plough agriculture and large-scale pastoralism. There are very few settlements located in areas of deep soils, providing little support for the possibility of widespread use of the plough. Many of the areas with deep soils today are the result of alluviation processes that have probably taken place since the EBA. Cereal/pulse rotation would most likely have been the most suitable mode of cultivation for these settlements in order to preserve the fertility of the soils, particularly if areas were continuously occupied for long periods of time. Over-exploitation of soils would have resulted in the depletion of nutrients (nitrogen, phosphorus and potassium) and would have led to a steady decrease in crop production (van Straaten 2002: 3). Crop rotation would alleviate these problems (in fact, the cultivation of pulses in crop rotation systems is valuable in that it helps to restore nitrogen levels in the soil; Jiskani 2004). If

FN-EBA communities failed to reinvigorate their agricultural areas with cereal/pulse rotation or fallowing, soil fertility and therefore production rates would inevitably have decreased, possibly leading to the movement of settlements to new areas with unexploited soils. We cannot rule out the possibility that the abandonment of certain settlements (and their possible re-occupation at later dates) may be the result of agricultural strategies that led to depletion of soil nutrients and/or erosion. Kythera also lacks extensive areas of pasture that could accommodate large-scale pastoralism, making the keeping of small numbers of a range of livestock a much more secure mode of subsistence. It seems that although marginality was probably not an issue for FN-EBA settlements, the most suitable and risk-reducing subsistence strategies would have involved small-scale mixed farming. Local variations in the productivity potential of different settlements could have been managed by being flexible and choosing to focus more strongly or less strongly on crops or livestock, depending on precise settlement location.

The archaeological evidence available for the FN-EBA on Kythera provides a good illustration of an instance where populations established themselves in what can be described as a classic Aegean semi-arid environment and where they were able to develop by making the most of the island's available resources in a structured framework of subsistence strategies. The above observations strongly suggest that FN-EBA settlement was subsistence-oriented, and that during EB II and EB III populations become much more knowledgeable of the potential of Kythera's resources compared to FN-EB I settlements. Furthermore, the EB II and EB III archaeological landscapes in particular stand out as an exceptional example of interaction between geographically distinct cultures (of the Mainland and Crete) that break through the regional barriers often assumed for the EBA Aegean. What is even more striking is simply the quantity of EB III settlements on the island at a time when most of the southern Aegean and the wider eastern Mediterranean are marked by settlement decline (Broodbank (2004: 76) has suggested that this may be the result of the Cretan communities on Kythera freely exploiting resources in the Cyclades during this phase). The investigations discussed in the present chapter, as well as Chapter 4, aimed at a broad-based investigation of the FN-EBA landscape on the island of Kythera. It has been shown that information derived from intensive survey can provide the springboard for a much more detailed investigation of archaeological landscapes and, consequently, similar approaches are deployed in the following chapters to explore the Methana Peninsula and the southern Argolid's Fournoi Valley.

CHAPTER 6

Northeast Peloponnesian landscapes in the Final Neolithic and Early Bronze Age: Methana

6.1 The archaeological background

The peninsula of Methana is situated in the Saronic Gulf and is linked to the northeast coast of the Peloponnese by a narrow isthmus ca. 1km long and less than 400m wide (fig. 6.1). It is described by Jameson (1976: 74) as one of the offshore parts of the 'southern Akte', otherwise known as the southern Argolid. Its location between Attica, the Peloponnese and the Saronic islands has meant that it has been part of various cultural spheres throughout the past, and at the same time its near-island character has sometimes allowed the inhabitants to maintain geographical, and even cultural or socio-economic isolation (Mee & Forbes 1997a).

Explorations, both in antiquity and in the 19th and early 20th centuries, have been fairly limited, and in many cases have focused on the volcanic nature of Methana and the resulting presence of thermal baths. A detailed list of historians and geographers that have visited Methana is presented by Forbes & Mee (1997: 1-2): the earliest historical and geographical accounts about Methana are by Thucydides and Strabo respectively; a small number of other ancient accounts have also been identified, among them one by Pausanias. Archaeological explorations in the 19th and early 20th centuries focused in particular on the fortifications across the isthmus, the acropoleis at Palaiokastro (ancient Methana) and Oga, the baths at Agios Nikolaos on the north coast and the remains in the area of Loutra (e.g. Aldenhoven 1841: 420; Bursian 1872; Curtius 1852: 439-442; Dodwell 1819: 278-281; Puillon Boblaye 1835: 57-58; Welter 1941: 6, 10). In the latter half of the 20th century, investigations by Hope Simpson and Dickinson explored these sites in more detail and further highlighted the prehistoric archaeology of the peninsula; Konsolaki and Simosi have also reported the presence of archaeological sites (Hope Simpson 1965; Hope Simpson & Dickinson

1979: 55; Konsolaki 1979; 1980; 1982; 1983; 1984; 1995; Simosi 1995). The most comprehensive archaeological investigation of the peninsula was carried out by the Methana Survey in the 1980s (Mee & Forbes 1997a). The sites known from earlier investigations were revisited during the Methana Survey and incorporated into the survey site catalogue, accompanied by the relevant references. Since the survey, Konsolaki has conducted an excavation of the LH III shrine at Agios Konstantinos (Konsolaki 1991). Prior to the Methana Survey, FN-EBA sherds had been identified on the isthmus (obsidian was also found there), at Palaiokastro and on the promontory south of Loutra (Nisaki; Faraklas 1972: 17; Hope Simpson 1965: 25-26; Hope Simpson & Dickinson 1979: 55; Welter 1941: 10).

To recapitulate the Methana Survey methodology described in Chapter 3, ca. 21% (10.5sq.km) of the peninsula was tractwalked. Almost all non-tractwalked areas consist of extremely steep slope, the most notable exception being the small built-up coastal plain of Loutra. Walkers were 10m apart and mostly followed the direction of the contours. The recording of transect artefact counts was implemented in all but the first year, collection was rare and dating normally took place in the field. Sites were investigated at the end of each transect. Material was normally counted within 1sq.m circles (ca. 0.56m radius) at fixed intervals from the site centre in north, west, east, and south directions (when it was not possible to proceed in a certain direction, another proximate direction was followed). Collection took the form of a grab sample from across the site, concentrating on diagnostic feature sherds and lithics. Site edges were defined by successive counts below 2 sherds per sq.m. In cases of large sites, grids were set or small transects were walked at defined intervals. The more uncertain sites were revisited for verification. In most cases on-site and off-site were easily distinguishable. Finally, the study of the pottery involved only a macroscopic analysis of diagnostics and fabrics.

Any site with FN or EBA material from the peninsula has been included in the current research. This chapter is roughly laid out along the lines of Chapters 4-5. To avoid repetition, the methodological details described in the analysis of Kythera have been omitted both here and in Chapter 7 (the Fournoi Valley in the southern Argolid). It is normal to use the term 'Helladic' for both areas because of their location in the cultural sphere of the Mainland; in order to compare them with Kythera, the discussions that follow have made use of the more generic term 'Bronze Age'. The chapter begins with an introduction to the environment of Methana, and then continues with an assessment of the peninsula's geomorphology, its impact on the archaeology, and the nature of the archaeological material itself. FN-EBA archaeological remains are then explored in terms of their site status, their chronology, size and function. This is followed by detailed analysis of the FN-EBA landscape (EB III has been excluded from the analyses because there is only one site). The final section explores the results and their implications for FN-EBA Methana.

6.2 The environmental setting

The peninsula of Methana covers an area of ca. 50sq.km and consists mainly of a steep mountainous landscape, often extending straight down to the coast. The volcanic nature of the peninsula has resulted in a complex patchwork of rocky peaks, lava flows and tiny stretches of flattish land scattered across the mountainous inland in the form of small internal basins (the biggest being Throni). The main flat areas on the coast consist of the small plains around Palaiokastro in the southwest and the modern town of Loutra in the southeast (cf. fig. 6.2 for toponyms mentioned in the text). The terrain is often difficult to traverse; Dodwell (1819: 280) wrote that '[t]he distance from Poros to the village of Methana is probably twelve or fourteen miles, but it is difficult to form a just calculation, as we more than once lost the way; and the latter part of the road was so extremely bad, that we probably did not proceed more than a mile and a half an hour.' Just over three decades later, Curtius (1852: 439) also described how the falling of rocks obstructed movement across the peninsula. Modern roads have clearly improved access from the Mainland, however, in places it is quite obvious that even today these can be badly affected by the steep terrain and resulting landslides, suggesting that sea routes may have often constituted the more reliable means of interaction between Methana and the outside world.

The **climate** on the peninsula tends to be warmer and drier than the surrounding region, which is already classified as one of the hottest and driest areas in Greece (Jameson 1976: 79). This is believed to have been the case throughout the Holocene (James *et al.* 1997: 5). In 1972-1974, Forbes took some readings of temperature, rainfall and winds from the village of Kypseli on Methana, located on the east coast and at an altitude of 220m (figs. 6.3-6.5). The north and east coasts are the most exposed areas on the peninsula and therefore tend to be drier and cooler, whereas the western coast is warmer and more humid (Forbes 1982: 37). Forbes' readings show a variation of 210mm of rainfall between the agricultural years of 1972-3 and 1973-4 (600mm and 390mm respectively); the former was probably above the norm, whereas the latter was regarded by the locals as within the expected range (Forbes 1982: 36). Despite the limited quantity of data, this difference does highlight the extent of interannual variability on Methana. What is also striking, however, is the spatial climatic variability, which has greatly influenced modern agricultural practices on the peninsula (Forbes 1976; Forbes 1982).

Methana forms part of the Aegean volcanic arc. With the exception of two limestone outcrops, one in the northwest and one in the south, the **geology** of Methana is volcanic, consisting mainly of andesites and dacites, but also of volcanic agglomerates between the domes, loose volcanic materials and some pyroclastic deposits (fig. 6.6). The contrast between the limestone and the volcanic geology is visually striking from the Peloponnese, as observed by the author from the mountain road that leads from the village of Ano Fanari to the village of Dryopi. Volcanic activity is thought to have begun in the late Tertiary or early Quaternary, whereas the most recent confirmed eruption dates to the 3rd century BC (Pe 1974: 270-271). Most of the domes and lava flows, however, are thought to date to the Pleistocene (Quaternary) and therefore soils would have already developed by the FN-EBA (James *et al.* 1997: 11). Overall, soils tend to be deeper on the volcanic rocks than on the limestone and in the coastal areas (Forbes 1982: 30, 33). Alluvial fans and valley and basin fills complete the geomorphological picture of Methana (James *et al.* 1994: 387). Andesite was also a potentially important raw material that was moving around the Aegean during the FN-EBA or even earlier (Pullen 1985: 336; Runnels 1981: as cited in Pullen 1985; Rutter 1993: 119-120).

Fresh water sources are scarce, with streams providing the main outlets for winter floods, as in the case of Kythera. The volcanic nature of the peninsula has resulted in the presence of several hot mineral springs along the north and south coasts (Forbes 1982: 34-35); these have brought visitors to Methana for health reasons in the past, and are an attraction even today. The only permanent spring with drinkable water on the peninsula is located near Palaia Loutra in the north (fig. 6.6), whereas a few seasonal springs can be found at higher altitudes. There is also limited brackish water in certain coastal areas, but this could have been accessed only if there were natural wells, and even then it would not have been suitable for human consumption. Modern settlements are supplied with water from the Troezen plain on the Peloponnese.

Good **natural harbours** are fairly limited on the peninsula. The most protected is the small harbour of Vathy on the west coast. It is probable that the little islet ('Nisaki') near Loutra also formed a promontory, thus creating a small protected harbour just to its south (Mee & Taylor 1997: 52). Other potentially protected coves are located near the isthmus, whereas the now filled outlets at Palaiokastro and Skoubia may also have once been used for safe anchorage (James *et al.* 1997: 11).

6.3 Measuring the integrity of artefact assemblages

6.3.1 Geomorphology

A detailed geomorphological investigation of Methana was carried out as part of the Methana Survey (James *et al.* 1994; James *et al.* 1997). The primarily volcanic nature of the Methana peninsula separates it from much of its surrounding areas and therefore renders difficult any direct comparison of erosional and alluvial processes. The main geomorphological processes observed were localised erosion and alluviation across the peninsula, as well as coastal erosion of cliffs by wave action. Although there is no geomorphological evidence for major erosion during the Holocene on Methana, the eroded nature of many of the denser FN-EBA scatters and the presence of off-site distributions have led to the suggestion of an erosion episode in the later 3rd millennium BC, resulting from extensive deforestation, but of non-catastrophic dimensions (James *et al.* 1994: 413-414; James *et al.* 1997: 30; although this seems to have happened at a similar time to the suggested wider eastern Mediterranean climatic event: Weiss *et al.* 1993; also Courty 1997). The examination of several single-period sites identified during fieldwalking led to the conclusion that, overall, erosion on Methana had had little impact on the actual transportation of entire artefact scatters despite their frequent location on fairly steep slope, thus suggesting that the archaeological record is fairly reliable. In fact, it has been suggested that 'on much of Methana's previously cultivated land, soil erosion may have brought sites into sharper focus by stripping them of the soil which concealed them' (James *et al.* 1994: 411). It is also pointed out, however, that other activities (settlement, short-term use, cultivation and grazing of livestock) would have disturbed artefact distributions. A major process that has inevitably affected distributions is terracing, which is wide-spread across the peninsula with the exception of very steep slopes. More than 80% of sites recovered during the survey are located on terraces. The earliest possible date for the presence of terraces on Methana is thought to be Classical; on the one hand, they will have prevented erosion and, on the other, disturbed the original deposition of archaeological material (James *et al.* 1994: 412; 1997: 28).

For the current research, the investigation of Methana began with the exploration of relative soil loss for the peninsula, using the same methods as in the case of Kythera. When assessing the spatial relationship between the survey sites and the relative soil loss map, it appears that only four of the 72 sites with FN-EBA material (pottery and/or lithics) are located in areas of greater soil loss; most are in areas of relatively low erosional movement (fig. 6.7). When compared with the total number of sites, the results are similar. When these observations were tested against the tractwalked area no statistically significant patterns emerged (at $p < 0.05$). The tractwalked area itself has undergone only medium to low relative soil loss. Figures 6.8a-b represent site densities (for the tractwalked area) within each relative soil loss category. Densities remain more or less constant in the five lowest soil loss categories and are followed by a sudden drop after that; the extremely high density in the 35-40 category is the result of a single site. The above suggests that areas more susceptible to soil loss and therefore with higher potential for smeared, destroyed or completely lost sites are mostly outside the tractwalked area.

As was mentioned in Chapter 4, the relative soil loss map only identifies potential areas of erosion, not of soil deposition. Major areas of alluviation were mapped by James *et al.* (1997) and their relationship to the sites recovered during the survey was explored (fig. 6.9). It emerged that 25 of the 105 sites identified during the survey and 17 out of the 72 sites with FN-EBA material are located on areas with alluvial soils (23.8% and 23.6% respectively). At a first glance, this does suggest that alluviation does not necessarily constitute a serious obstacle to the recovery of FN-EBA sites. However, the 72 sites comprise all scatters containing FN-EBA material, including those multi-period sites with one or two possible sherds or lithics. If one were to explore the location of scatters given full FN-EBA site status (cf. section 6.4.1), it would appear that only five of the 44 sites were located on alluvial soils (11%), all five were located primarily on terraces. Alluviation is most likely to have occurred in areas of foot-slopes, internal basins and coastal valleys. The two areas that have been noted in particular for post-EBA alluviation are the Throni basin to the south of the peninsula and the flatter areas of Palaiokastro and Skoubia on the west coast (James *et al.* 1997: 11, 30-31). In the Palaiokastro area, the extent of alluviation in recent centuries is exemplified by the build-up of soil around the small church of Agios Nikolaos, southeast of the acropolis. Attention needs to be drawn to site 010, which is located here: the surrounding areas of the site have had much alluviation, but the actual FN-EBA site is mainly on the acropolis of Palaiokastro, and therefore on elevated ground with no alluviation. The site has consistently been attributed some of the lowest values in the analyses carried out as part of this research; this is because the acropolis does not show up as prominently as it should on the DEM, probably as a result of limited detail on the original army maps. This bias has been taken into account when considering the results of all the analyses that follow in this chapter. In terms of the impact of volcanic activity and lava flow on surface remains, the only recorded eruption since the EBA is that near Kaimeni Chora in the 3rd century BC, which resulted in lava flowing over a fairly limited area in the northwest of the peninsula (James *et al.* 1994: 396; James *et al.* 1997: 10). Any FN-EBA sites in this area will have been obscured (fig.10).

The above observations suggest that although the surface scatters identified across the peninsula are most likely to be in the vicinity of their respective sites of origin, there is nevertheless a strong possibility that some sites will have been obscured by alluviation (depending on its depth and extent of subsequent land use), the 3rd century volcanic eruption and the terrace systems. Despite the overall clear distinction between on-site and off-site artefact densities, the presence of some sparser scatters, mainly just below major FN-EBA settlements and possibly constituting eroded sites, is also drawn to our attention (James *et al.* 1994: 395, 414; Mee & Taylor 1997: 42). This suggests the possibility that FN-EBA sites are not necessarily being missed in their entirety, but that nevertheless they may lack the kind of resolution that allows us to attribute site status. If this is the case, then the suggestion by Bintliff *et al.* (1999: 161) that the 25 sites in the Methana publication with fewer than five FN-EBA sherds may actually have been sites may hold true, at least for some of them. However, we cannot talk of the kind of hidden landscape Bintliff *et al.* (1999) describe, where prehistoric material is mainly recovered within multi-period sites and where sub-0.1 ha sites are likely to be missed; although off-site FN-EBA material was identified during fieldwalking and in some cases could have represented missed or lost sites, the FN-EBA sites themselves were not identified solely as minor components in large multi-period sites: of the 51 sites with FN-EBA material as presented in the Methana publication, 12 FN-EBA sites are single-period (four of these are sub-0.1 ha) and another three have a major FN-EBA component (Mee *et al.* 1997; Mee & Taylor 1997: 43).

6.3.2 Archaeology

The archaeological material used to date FN-EBA sites consists primarily of pottery, as well as chipped stone. The most common ceramic fabric is 'rather coarse gritty reddish' ('RCGR'), and is thought to be of local origin due to its similarity in colour to the volcanic bedrock of Methana (Mee & Taylor 1997: 42-44, though this has not been confirmed microscopically). Despite the fact that, like most prehistoric pottery, this too tends to become heavily eroded, it is nevertheless highly durable and diagnostic.

Its similarity in colour to the local bedrock may have inhibited detection to some extent, but the recovery of RCGR material from over 50 sites (half the total number of sites in the survey area), including single-period sites, suggests that visibility was probably no more an issue here than in any other survey in the southern Aegean. The lack of significant amounts of pottery dating to EB III is probably not a result of poor preservation or visibility on Methana specifically, but part of a wider phenomenon throughout the Peloponnese (cf. Chapter 3). Of the chipped stone, it is obsidian that is most abundant and strongly associated with FN-EBA sites. 46 out of the 51 sites (as presented in the Methana publication) with definite FN-EBA sherds also had obsidian (over 90%). With the exception of site 003 in the Throni basin, the remaining 15 sites with obsidian but no FN-EBA definite pottery had a maximum of six chip fragments (Mee & Forbes 1997a: Appendix 1). Obsidian is highly durable and therefore its preservation is not really an issue in survey (though its recognition by fieldwalkers may be). However, the fact that obsidian tends to be transported over greater distances than sherds, as was observed by Whitelaw (1991a: 202-208) on the site of Kephala on Keos, needs to be borne in mind.

6.4 Defining the FN-EBA dataset

6.4.1 The FN-EBA dataset

A total of 105 scatters were registered during the Methana Survey. On the basis of the information provided by Mee and his colleagues (James *et al.* 1994; Mee *et al.* 1997; Mee & Taylor 1997), it appears that the assemblages of 56 included definite FN-EBA pottery. This figure includes sites 055B, 063 and 111 as separate FN-EBA scatters as opposed to part of sites 055C, 064 and 219 respectively. It also includes sites 069 and 220, on which FN-EBA material was identified during subsequent detailed investigation (James *et al.* 1994). Another 16 sites include possible FN-EBA pottery (one site), obsidian (11 sites), or both (four sites). A detailed list of sites with pottery and lithic counts is presented in table 6.1. Unfortunately no detailed tractwalking data is available for the investigation of the wider FN-EBA landscape.

6.4.2 Site chronology

Dating to individual phases of the FN-EBA is mentioned only briefly in the Methana publication, and not for individual sites (Mee & Taylor 1997: 45-46). There are some reservations with regard to the exclusively EH I date of red-slipped and burnished pottery and the EH II date of *Urfirnis*. However, the majority of southern Mainland assemblages seem to confirm the reliability of both surface treatments as chronological markers, and therefore they have been used here to date sites to EH I or EH II respectively.

Despite the presence of *Urfinis* in EH III contexts at Tiryns (Weisshaar 1983), in the case of Lerna it is characteristic of the site's period III (EH II phases), not IV (EH III) (Caskey 1960; Rutter 1995: 22; Wiencke 2000: 325), and has been found consistently in EH II contexts across the southern Mainland (French 1968; French 1972; Wace & Blegen 1918; Wiencke 2000). In the analyses that follow, all *Urfirnis* sherds have been used as EH II indicators.

Red-slipped and burnished pottery has been identified at various sites, mainly across the northeast Peloponnese (Corinthia, Argolid) and the eastern Sterea (Attica, Boeotia), but also further afield (French 1968; Phelps 1975; Wiencke 2000). Mee & Taylor draw attention to the fact that it has sometimes been located in the same context as EH II pottery, e.g. at Corinth, Eutresis, Zygouries, Askitario and Agios Kosmas, thus rendering it unsuitable for dating sites to the EH I. Wace and Blegen (1918: 176-177) describe two major definitive ceramic categories for EH I: 'polished monochrome ware' and 'slipped monochrome ware' (cf. also French 1968: 56-59; French 1972: 18-20), which Blegen continues to use for Korakou and Zygouries (Blegen 1921: 4-5; Blegen 1928: 76-83), though his second category also includes some EH II shapes. Not all sites with EH II context red-slipped and burnished pottery are very well stratified; at Corinth, for example, red slipped and burnished pottery was found with EH II, but also with Neolithic material (Weinberg 1937: 516). Among the less well stratified contexts Wiencke has identified Askitario, Agios Kosmas (Mylonas 1959: 22-23; Theocharis 1961: 66-67), and also Korakou and Zygouries (Wiencke 2000: 631-632). At the same time, a detailed investigation of the Neolithic pottery sequence across the southern Mainland has led Phelps to conclude that red slipped and burnished pottery is most likely to date to FN or EH I (cf. also Coleman 1992: 258; Phelps 1975: 320; Phelps 2004: 104, 112, 125). Dousougli (1987) identified red-slipped and burnished pottery at Kefalari Magoula and dated it to EH I, but she suggested that its abundance decreases towards the end of the phase; she also observed parallels with Makrovouni and the Talioti plain, but not Tiryns or Lerna. Wiencke has since fully published Lerna III (EH I-EH II), and has identified a limited number of similar sherds with red or reddish brown, highly polished or burnished surfaces, which she has dated to EH I (Wiencke 2000: 329-331, 631). She draws attention to EH I parallels from well stratified settlements, such as Eutresis (Caskey & Caskey 1960: 138-139, 162), Vouliagmeni (Fossey 1969: 53-69), Kefalari and Tsoungiza (Pullen 1984; Pullen 1988). However, she does point to the presence of pottery surface treatments similar to Blegen's AI and II classes in the earliest EH II phase at Lerna (though outnumbered by other EH II types), as well as to red-slipped and burnished in some early EH II contexts, such as at Lithares, Corinth, Asea, Tsoungiza and Eutresis (Wiencke 2000: 325-326, 632, 641-643). What we may therefore be seeing is a continuation of use of this surface treatment into the very early stages of EH II at some sites, something that would tie in with the concept of a smooth transition between the EH I and EH II phases as suggested by Phelps (Phelps 1975; Phelps 2004).

If the red-slipped and burnished pottery also constituted a major EH II signature on Methana, then the total number of possible EB II settlements described below would double. However, there is no evidence to suggest that Methana should form an exception to the overall pattern (unfortunately there is no local stratified FN-EBA excavation sequence available), and therefore for the analyses that follow it has been used primarily as an FN-EB I indicator. The possibility that some FN-EB I sites may have continued into the early stages of EH II will also be considered later on. Besides the pottery, certain types of obsidian artefacts are also possible indicators for dating sites to the FN-EBA phases. The detailed site and artefact catalogues provided by the Methana publication make possible the identification of the following ceramic and lithic diagnostics (Gill *et al.* 1997; Mee *et al.* 1997):

- FN-EH I: 'perforated vessels' (should be FN but a lack of pattern burnished pottery in the survey area may imply FN-EH I); red-slipped and burnished (FN-EH I); micro-cores; scrapers and retouched chipped stone (EH I).
- EH II: *Urfirnis*; yellow slipped; tabular cores
- EH III: Dark slipped and burnished; dark on light

Table 6.2 shows the FN-EBA phases present at each site and their component values in each case. Based on the above material classifications, the surveyed area of Methana produced 29 FN-EB I sites, 12 EB II sites and a single EB III site (figs. 6.11 & 6.12). Component values are based on the proportion of FN-EBA material compared to other periods, the volume of material, mainly pottery but also lithics, and the likelihood of each scatter representing a site. Figure 6.11 also shows the number of sites weighted by century. Although this suggests that the number of sites in FN-EB I and EB II are more or less the same per century (EB II slightly more), it seems likely that most of the FN-EB I sites date to the late FN or the EB I phases, in which case it would be more realistic to weight the sites by 700-800 years and not 1500. In this case the weighted frequency of FN-EB I sites would be greater than that of EB II sites. In any case, although it seems highly improbable that sites were occupied for most of the FN-EB I or EB II phases, one cannot ignore the likelihood that some sites will have had life-spans longer than a century, and overall the expected increase in the number of sites between EB I and EB II is not observed. This is also suggested by the presence of more than one FN-EBA phase in some locations, suggesting continued occupation or re-occupation: nine FN-EB I sites also have EB II material, and the only EB III site also dates to both FN-EB I and EB II (figs. 6.13 & 6.14). The resulting pattern indicates a reduction in the number of sites between FN-EB I and EB II (and even more so between EB II and EB III) and, interestingly, there are only three EB II sites in previously uninhabited locations.

6.4.3 Site size

Establishing the size of FN-EBA sites has been problematic for three reasons: firstly, multi-period sites have only been attributed a general size; secondly, some of the exclusively FN-EBA sites date to more than one of the phases; and finally, as a result of visibility conditions or poor site integrity, the size is sometimes an estimate rather than an accurate measurement in the field. Based on tables 6.1 & 6.2 a total of 19 sites have individual FN-EBA sub-phases with a component value of 2 or 3 (i.e. minor and major concentrations). Only eight of these are single-period, and of these single-period sites three only have size estimates. The remaining five sites (028, 104, 105, 107 and 206) date to FN-EB I: site 105 stands out as the largest at ca. 1ha, 028 is just over 0.1 ha, and sites 104, 107 and 206 are all well under 0.1 ha. What can be discerned more easily, however, is the maximum size for each site (fig. 6.15).

Out of 29 FN-EB I sites, 17 are under 0.3 ha (including multi-period or multi-phase sites etc) and another three sites constitute tiny components of the whole site (component value 1) and have therefore been placed in the 0-0.3 ha category. Three further sites are 0.4-0.5 ha in extent: two are single-period but their size is an estimate; FN-EBA is the major component on site 103, so this measurement should be secure. The six remaining sites cover areas of 1-1.6 ha. It seems unlikely that the nine sherds and 10 pieces of obsidian on site 009 could justify a site size of 1.6 ha, and in fact this was excluded from site size discussions in the Methana publication; it has been attributed minimum site size for the purpose of this investigation (0-0.3 ha). Sites 108 and 124 are multi-period, but the FN-EBA is the major component in both cases. They both have evidence of FN-EB I and EB II occupation. Although the size of site 010 has been broken up further chronologically, the resolution is still coarse: the 1.1 ha extent is Neolithic to Late Helladic. What is mentioned in the Methana Survey notes (Mee n.d.), is that the FN-EBA is mainly concentrated on the acropolis summit, the upper-most terrace and a field directly N. The acropolis itself covers an area of just over 1 ha. It is not clear what area the summit, upper terrace and field cover, but considering that this is the only site at which all FN-EBA phases are represented, a size of 1 ha is possible, though not necessarily for all three periods. The area covered by site 067 is also broken up chronologically and this time a site extent specific to the FN-EBA is provided. The presence of both FN-EB I and EB II material means that it is not possible to estimate site size for individual FN-EBA phases with confidence. Site 105 is a single-period FN-EB I site covering 1 ha or so. This is of particular importance because this is the only site for which the full extent can be securely dated to FN-EB I.

Out of the 12 EB II sites, site 003 is a lithics site only and is therefore excluded. Four sites are under 0.3 ha and another two constitute tiny components of the whole site (component value 1) and have therefore been placed in the 0-0.3 ha category (fig. 6.17). Site 103 is the only one within the 0.3-1 ha range (0.48 ha), whereas sites 010, 067, 108 and 124 are all 1-1.6 ha (cf. supra). There are another 12 FN-EBA sites which cannot be dated more precisely. Nine sites are under 0.3 ha in size, one covers an area of 0.4 ha (it was suggested in the Methana publication that this site may originate further up the slope), one is probably a tool-production site and one was too disturbed to be assessed for size (Mee *et al.* 1997).

Figure 6.16 presents all FN-EB I sites in terms of their size and their distance to the nearest 1ha+ site. These larger sites are located in four fairly distinct areas (sites 105 and 108 are very close together) and are surrounded by varying numbers of smaller sites. Sites 124 and 105/108 have seven smaller sites well within 1.5 km, site 010 has three and site 067 has one (and one more within 1.6 km). If the 12 non-phase-specific FN-EBA sites were added to this distribution, the observations would be fairly similar, with the exception of site 010 which would now have double the number of sites within 1.5 km. All five larger sites are located on acropoleis or ridges and their surrounding terraces. Sites 010, 067 and 124 are close to the coast (within 200m) as opposed to sites 105 and 108, which are more inland. In fact site 108 is the FN-EB I site with the highest altitude. EB II sites are far more scattered. Four of the 1ha+ sites are also EB II, which is a third of all sites dating to this phase. Clearly the inability to distinguish between FN-EB I and EB II site extents has its problems, but the data does allow the consideration of plausible patterns and what they might mean. This is explored in section 6.6.

6.4.4 Site function

The pottery shapes identified on FN-EBA sites have been generically classified as open or closed vessels, though wherever the preservation is good enough they have been described in more detail: the shapes identified in the FN-EBA assemblage include bowls, basin, pithoi, sieves, jars, jugs, sauceboats, and possible askoi, ladles, cooking pots and frying pans (Gill *et al.* 1997; Mee & Taylor 1997: 44-45). Items such as bowls, jugs and sauceboats indicate food consumption, basins, sieves, ladles and cooking pots may indicate food preparation and pithoi, jars and askoi may indicate storage (closed shapes may generally fit into this category also). Textile production is indicated by the presence of loom-weights or spindle-whorls. Bearing in mind the problems that affect the assessment of site function, the presence of most of these can be used to suggest settlement status for at least 18, and maybe even up to 36 sites. Table 6.3 shows the ceramic shapes present on each FN-EBA site, the volume of obsidian and the presence of any ground stone (suggested function is included in table 6.1). Although ground stone need not necessarily be associated with the FN-EBA distributions of multi-period sites, for four of the five sites with ground stone the major if not only component is FN-EBA.

There is a disproportionately wide range of shapes on some of the sites (e.g. 010, 012, 067, 103, 105, 108, 124), and the low pottery counts at some other sites may indicate that not all shapes originally in use are necessarily represented in the assemblages. It is interesting that no hearth fragments were located at any of the sites (they are found on several sites both on Kythera and in the southern Argolid). Of particular interest are sites 117 and 118, which, although containing definite FN-EBA components, cannot unfortunately be dated more finely. Both sites are located at high altitudes in the centre of the peninsula and at considerable distances from other FN-EBA sites. Although they cannot be included in the phase-specific analyses of section 6.5, they will be included in the discussion in section 6.6.

The abundance of obsidian on a number of sites, particularly in the form of chips or blades, suggests the possibility that some were either primarily tool production sites or at least part of the function of some of these sites was tool production (a total of nine sites scattered across the fieldwalked areas). Site 003 is the only site with a substantial amount of obsidian but no FN-EBA pottery whatsoever. It is, therefore, most likely a tool-production site only. Several sites close to 003 also contain small amounts of obsidian but no FN-EBA pottery. The alluviation of this basin may mean that any possible settlement site has been completely obscured (cf. section 6.3.1). This, however, does not explain the presence of the obsidian in the area. Is it possible that we are seeing erosion of material from higher ground, outside the fieldwalked area? Or has obsidian surfaced as a result of subsequent activity and localised processes on these particular terraces in Throni? Whatever the case for site 003, it appears that the majority of FN-EBA sites are most probably settlements, though whether permanent or seasonal is not something that can be established unequivocally (cf. supra Chapter 3).

6.5 The FN-EBA landscape

6.5.1 Inter-site spacing

Nearest neighbour analysis was carried out to suggest appropriate wider activity areas for sites in each sub-phase (with the exception of EB III). However, no statistically significant patterns emerged. The FN-EB I sites produced a rather incoherent pattern which indicated that most sites have a neighbour within 650m (fig. 6.18a. The considerably shorter distances between several sites suggest that the pattern is far more complex, possibly as a result of site contemporaneity issues and the rather fragmented nature of the Methana landscape. The effect of the Methana terrain is particularly obvious when exploring EB II inter-site distances: eight of the 12 sites are more than 1300m away from their nearest neighbour (fig. 6.18b). These results do not suggest an obvious wider activity area for these phases and, furthermore, the exploration of ceramic fall-off from sites was not possible with the published data available. For comparative purposes, the 150m radius identified for the EB III period on Kythera has been used here as a basis for the analyses that follow. It was explained in Chapter 5 that this is not meant to be deterministic in any way, but simply a means of achieving a more holistic impression of site location.

6.5.2 Landform metrics

FN-EB I and EB II sites were explored statistically against altitude (site centres), slope (wider activity areas), aspect (site centres and wider activity areas) and surface curvature (site centres). No significant patterns emerged for altitude or aspect. All sites dating to specific FN-EBA phases are at altitudes below 450m, but then so is 90% of the surveyed area. Aspect shows no clear pattern for either site centres or their wider activity areas (fig. 6.19). The investigation of slope highlighted a significant pattern for FN-EB I (fig. 6.20). The sites are characterised by a preference for gentler slopes in their vicinity: at the point of maximum difference between observed and expected, 53% of the total wider activity areas have 0-6° slope, against an expected 29%. No significant patterns emerged for EB II, though this may be a result of the small number of sites (figs. 6.21a-b).

The sizes of the cell neighbourhoods in the surface curvature analyses were set to correspond with those used on Kythera, since one Methana grid cell equals four Kythera grid cells (however, this does not assume exact equivalence because the difference in grid cell size will still have some effect). Therefore the range investigated for Methana consisted of 3x3 (the smallest possible), 13x13 (ca. Kythera's 25x25), 25x25 (ca. Kythera's 49x49), 37x37 (ca. Kythera's 75x75) and 49x49 (ca. Kythera's 99x99). The analysis highlighted a significant difference for all cell neighbourhoods for FN-EB I (figs. 6.22a-e). Further exploration was carried out using 75x75 or 99x99 cells, though no significant patterns emerged. The strongest relationship between sites and surface curvature is observed in the 13x13 cell neighbourhood, and weakens substantially as the window size increases or decreases. It is striking that although in all cases the largest or second largest concentration of sites is found on -0.1-0.1 values, with the exception of the 49x49 cell neighbourhood, it is in this category that sites are significantly fewer than expected. A similar observation was made when exploring the Kythera sites. Twenty percent or more of the total tractwalked area fits into this category, which may have exaggerated how low the site numbers actually are within this category. The histograms in fig. 6.23 show how the number of sites seems to decrease in both directions, though much more abruptly in the 'negative'. The results suggest that settlements tended to be located mainly on flat or mildly convex features while avoiding channels or gorges. Giving site 010 a more positive value would only have accentuated the significant results without affecting those with no significance. No significant patterns emerged for EB II sites, though the majority are in similar locations to FN-EB I sites. In this case a more positive value for site 010 would have affected the results of the 13x13 cell neighbourhood, which would have produced statistically significant patterns in line with those observed in FN-EB I. Surface curvature was explored further for the wider activity areas, but no significant patterns emerged.

6.5.3 Geology

A total of 10 IGME geological categories fall into the tractwalked area (fig. 6.24):

- Andesite domes and flows
- Barremain limestones
- Coastal/valley deposits (undifferentiated)
- Dacite domes and flows
- Dogger-Cretaceous mixed volcanic deposits
- Loose volcanic deposits
- Lower Cretaceous conglomerates
- Middle Triassic limestones
- Pyroclastic deposits of Palaiokastro
- Volcanic agglomerates

In order to keep to the chi-square test restriction of a maximum of eight categories, of which only up to 20% may have under 5 expected sites and none under 1 expected site, the 10 categories had to be grouped: 'andesite and dacite domes and flows' were grouped together, 'loose volcanic deposits' formed the second group, and the 'remaining geological categories' formed the third group. The results indicated a significant preference for andesites and dacites for FN-EB I, but not for EB II (once again this may be because of the low number of sites). Fifty-six percent of FN-EB I and 60% of EB II wider activity areas were located on andesites and dacites against an expected 30%.

The geoarchaeological map (drawn up for the survey by James *et al.* 1997: 6) was used in the same way in an attempt to confirm and possibly further highlight the results from the study of the IGME map. Eight geological categories fall into the tractwalked area, which include more detailed alluvial deposits (fig. 6.25):

- Alluvial fans and basin fills
- Andesite domes and flows
- Dacite domes and flows
- Loose reworked volcanic products
- Lower Cretaceous limestone
- Middle Triassic – Middle Lias limestones
- Pyroclastic deposits
- Volcanic agglomerates

The three groups explored were similar to those of the IGME map: 'andesite and dacite domes and flows', 'loose volcanic deposits' and 'remaining geological categories'. The results confirmed the already established preference for andesites and dacites for FN-

EB I, this time 57% against an expected 31% (62% for EB II, though again not statistically significant).

6.5.4 Peninsula hydrology

The scarcity of permanent springs on the peninsula does not allow for any meaningful statistical analysis of the relationship between these and FN-EBA sites, although it is clear that the one known permanent spring near Palaia Loutra does not seem to attract settlement. However, this spring and the seasonal ones in the mountains will be discussed in the next section.

The hydrology of the peninsula was investigated in terms of water runoff and drainage systems. As a first step, site centres were explored in relation to flow accumulation (fig. 6.26). The analyses highlighted a significant difference only for the FN-EB I sites, suggesting a preference for site location on cells with less than 0.4 ha (>10 cells) draining into them (25 out of 29 sites, or 86% against an expected 61%). No significant pattern emerged for EB II, though 10 EB II sites (83%) are located on cells with 10 or fewer cells pouring through them. Site 010 appears to be in an area of high flow accumulation, when in fact it is not. For the analysis it has therefore been added to the low flow accumulation group. Flow accumulation was explored further for the wider activity areas of the FN-EB I and EB II sites, but no significant patterns emerged. It is worth noting, however, that in both cases over 70% of the total wider activity area had less than 0.4 ha draining into it (i.e. into each 400sq.m grid cell).

Watersheds were also delineated (fig. 6.27). In this case the threshold was set to 175 cells, as it is fairly close to the wider activity areas of sites (7 ha). The analyses highlighted a significant difference for FN-EB I (fig. 6.28a). The results suggest that there is a preference for site location within 30m of watershed boundaries (21 sites – 72% against an expected 40%). Although the maximum difference is at this threshold, the location of FN-EB I sites remains significant up to 60m (26 sites, or 93% against an expected 66%). It appears, therefore, that sites are preferentially located closer to watershed boundaries, i.e. in areas with relatively low amounts of water draining through them. Ten EB II sites (83%) are also located within 60m of a watershed boundary, though this was not validated statistically (fig. 6.28b).

6.5.5 Coastal proximity

Finally, coastal proximity was investigated for FN-EB I and EB II sites, but no significant patterns emerged despite the location of 93% of FN-EB I sites and 75% of EB II sites within 1km of the coast. This can be explained by the fact that 76% of the tractwalked area is also within 1km of the coast.

6.5.6 Interpreting the results from the data analysis

The above analyses have highlighted significant patterns for FN-EB I, but very little for EB II, while the presence of only a single EB III site excludes this phase from analysis altogether (table 6.4). It was suggested in Chapter 5 that a lack of significance in some phases or for the FN-EBA as a whole need not imply a lack of importance of certain features for site location, but possibly simply the inability to confirm it. The environmental variables will also be discussed therefore with regard to EB II.

Slope, surface curvature, geology, flow accumulation and watershed boundaries are statistically significant for FN-EB I sites. All variables can be associated with subsistence strategies, and slope, surface curvature, watershed boundaries and particularly flow accumulation may also have been considered in terms of protecting settlement structures from processes such as flooding or erosion. As with the Kythera dataset, all significant variables were explored for interdependence. The only case where there appears to be a relationship between variables is for slope and geology: when geology is weighted by slope it is no longer significant. Once again, this suggests that the variables are correlated to such an extent that they cannot be picked out statistically.

The preference for gentler slopes and the lack of significant patterns associated with aspect suggests that FN-EB I communities were choosing land for agricultural practices that do not involve terracing (cf. Chapter 5). The sites that stand out as having a substantial area of wider activity on slopes greater than 13° are 014, 104, 105, 106, 107 and 108, all of which are located in the same area. There is no impressive amount of 0-13° in the vicinity, except for 15-18 ha just beyond the wider activity areas of sites 104 and 105, and this area is partly covered by sites 013 and 012. There are some small patches of flatter land above site 108, within ca. 1km, and of course there is the Loutra plain, though this may have had its own settlement(s).

Although it is possible that the significance of the geological pattern is a result of its correlation with slope, it is still worth while considering the benefits of exploiting soils that form on andesites and dacites, since the wider activity area of 16 sites out of 29 is dominated by such soils. They tend to be 'distinctive soil-forming environments' (James *et al.* 2000: 324) and the soils are primarily loams, which can be clay or sandy (surface layers are often more sandy). These soils have been found to be calc-alkaline and iron-rich, and they are regarded to be more fertile and on gentler slopes than the soils that are formed on the limestone outcrops of the peninsula (James *et al.* 1997: 16-17). The wider activity area of another seven sites is dominated by loose volcanic deposits (nine according to the IGME map), which would appear to be fairly similar in nature to the soils that form on the andesite and dacite lavas. The wider activity areas of only two sites are predominantly limestone (103 and 204).

Turning to hydrology, the significant preference for actual settlement location at points where no more than 0.4 ha flow through suggests that there is perhaps a conscious decision to protect actual dwellings from flooding or soil erosion. There are four sites that do not fit the general pattern, of which three have ca. 0.5 ha flowing through (013, 015 and 054); the site that really stands out for not conforming to this pattern is 009 with 1.2 ha flowing through the site centre.

Surface curvature clearly plays a role in FN-EBI settlement location, but its significance over a series of window sizes is intriguing, particularly as there are subtle differences in the distribution of sites as the window changes. Indeed, it is interesting that the strongest relationship was found in the 13x13 cell neighbourhood, as this is also the closest to the pre-defined wider activity area of sites. What is also worth noting is that this is the scale for most sites on 'positive' surfaces (values greater than 0.1). Nevertheless, it seems that over a wide range of scales FN-EB I sites are usually located on low/medium relief, mainly flat areas, or small ridges and hills. No sites really stand out as being located in channel areas, whereas the most prominent ridge site is 108. In terms of watershed boundaries, only two sites are more than 60m away from one in this phase (124 and 207; site 124 is within 90m). It was suggested in Chapter 5 that the location of sites on the edges of watersheds may indicate an attempt to make use of the moisture that is captured in the soil and drains through the shallower parts of these basins.

The FN-EB I and EB II phases were explored systematically in order to identify patterns of settlement on Methana. The inability to draw significant patterns for EB II Methana is most likely a result of the low number of sites available for analysis. If one looks at the proportion of EB II sites in relation to the significant variables identified for FN-EB I, it is clear that overall EB II sites follow similar patterns, despite the fact that these cannot be validated statistically. They are predominantly in areas of gentler slope, on volcanic soils, near watershed boundaries, with relatively little water flowing through their site centres and in areas of low/medium relief. The potential of this will be discussed in the next section, along with the importance of the location of site 010 as the only definite EB III site to be found on the peninsula.

6.6 Settlement patterns and subsistence strategies on FN-EBA Methana

The FN-EB I sees the first major settlement occupation of Methana. With the exception of possible earlier Neolithic material on site 010, there is no solid evidence for occupation before the FN on the peninsula. A roughly two-tier hierarchy may be present if we assume that the variation observed in the size of FN-EBA sites is a characteristic of FN-EB I: the majority of sites cover areas of under 0.3 ha and probably mostly consist of no more than 2-3 households; another three are a little larger, but under 0.5 ha in size (103 and possibly 012 and 111/219); the five remaining sites cover areas of 1-1.5 ha. Two thirds of the sites are located in the northeast and east coastal areas, including four of the 1ha+ sites. The location of two large sites (105 and 108) at such close proximity (the site centres are 550m apart) is a little perplexing if one assumes that they were contemporary and occupied the full extent of the scatter throughout their existence. Sites 124, 067 and 105/108 are evenly spaced along the northeast coast. The most discrete concentration of settlement is located in the area of Palaiokastro on the west coast, with sites 053 and 054 next to the harbour of Vathy. Sites 060, 112, 204 and 103, on the other hand, appear to be the settlements most widely spaced from their neighbours. Site 103 is the only 'medium'-sized settlement on the peninsula without an estimated size, though it is not clear whether coastal erosion has resulted in the loss of part of the FN-EBA site. It is situated just off one of the largest coastal basins, which unfortunately could not be surveyed because of its occupation by Loutra, the largest modern town on Methana. It would seem most likely that we are missing FN-EBA settlements from this area, as it consists of little steep slope, good soils, and a fairly protected harbour. Site 103 could have been the largest site, but equally there could have been another larger one beneath modern Loutra.

All FN-EB I sites are characterised by at least two, though in most cases four out of the five significant locational variables. Irrespective of whether they are contemporary or not, these primarily rural settlements appear to have similar preferences and foci. The landscape of Methana is generally perceived as a fairly unwelcome environment of steep slopes and little water, and occupation of the peninsula really does seem to have begun in earnest at the same time as other marginal areas of the southern Aegean were being filled. Yet these settlements occupied pockets of land consisting of considerable gentle slope, productive soils, and fairly good drainage. It is not clear when exactly in the FN-EB I these settlements were occupied; the presence of perforated vessels on a third of the sites suggests that some of them at least were occupied in the late FN (012, 053, 067, 103, 104, 105, 107, 108, 112 and 206), whereas the remaining settlements are more likely to have been occupied at some point in EB I. The presence of FN, EH I and EH II signatures at some of the sites suggests a more long-term occupation, or at least continuous re-occupations. Whether the population movement into Methana took place suddenly or gradually, the data suggests that communities were targeting specific niches with agricultural potential. There appears to be little experimentation in the FN-EB I occupation of Methana. It would be interesting to know where exactly these communities came from: were they choosing areas similar to those they were used to, i.e. were these choices based on their experience in other areas (e.g. the Saronic Gulf) Were they from neighbouring areas, aware of the potential of Methana and simply making use of it when it became necessary (e.g. the northeast Peloponnese)?

The assessment of population numbers is difficult to undertake because of the inability to establish whether the large extents of some sites date to FN-EB I, EB II or both. Tables 6.5 & 6.6 show suggested household and population numbers for a 600-1000sq.m range of surface area covered by each household for FN-EB I and EB II: the un-weighted FN-EB I population within the tractwalked area of Methana may have ranged between 490 and 780 people (50-80 people per sq.km). The top value is too high if one considers that it is extremely unlikely that all sites were occupied simultaneously and throughout the period (or in some cases throughout the year). What also needs to be considered is the possibility that not all large sites were that big in FN-EB I, but may in fact have reached their full size in EB II (with the exception of 105 on the east coast which has no definite EH II signatures). It is also worth noting that with the exception of the Loutra plain, all areas not tractwalked were probably too steep to hold settlements. The uninhabitable nature of most of the non-tractwalked areas of Methana and the extremely high population numbers estimated here suggests that these figures should be taken to reflect the whole peninsula, excepting Loutra, in which case the un-weighted population density would have ranged between 10 and 15 people per sq.km.

At a first glance, the number of settlements appears to shrink by at least half in EB II, though only by a third when the numbers are weighted for phase duration (cf. supra). Four of the large FN-EB I sites also have an EB II date, which can have a number of implications for settlement patterns and variation between the two phases. One possibility is that part of the population moved out of Methana at the end of EB I or earlier on in EB II, and what we are seeing is fewer people in the landscape, and maybe even shrinking of the originally 1ha+ FN-EB I settlements. The suggested un-weighted population range for EB II in this case would be 115-170 people (12-18 people per sq.km; 2-4 people per sq.km for the whole peninsula). However, another possibility is that these bigger settlements were never that large in FN-EB I, but extended as part of nucleation processes and the abandonment of the wider landscape in EB II. This may also have been accompanied by population movement out of Methana. If this were the case, then the FN-EB I settlement network would not have had the two-tier hierarchy discussed above. Furthermore, the FN-EB I population may have been more than a third smaller than the original estimations (30-45 people per sq.km; 6-9 people per sq.km for the whole peninsula), whereas the EB II population may have been almost triple (30-50 people per sq.km; 6-10 people per sq.km for the whole peninsula). These figures are always based on un-weighted estimates, and it is likely that they form the upper margin. It is clear, however, that the population densities seem far more plausible when weighted by the whole peninsula and not just the tractwalked area.

This second possibility also ties in with the more scattered location of EB II settlements across Methana (cf. supra, section 6.4). A two tier-hierarchy was suggested by Mee and Taylor (1997: 53-54) for EB II, based on the presence of fine-ware on some of the sites and on the assumption that there was a greater number of EB II sites than those identified. Four out of the 12 EB II sites discussed here are potentially 1 ha or more in extent, and site 103 may have also been larger than the present surface scatter suggests. There is no clustering of smaller settlements around them. What we may be seeing is a two-tier hierarchy, in which sites are more 'loosely' connected, while at the same time acting fairly independently and making the most of the more extensive, even if still fragmented, patches of agriculturally favourable areas that surround them. This would also tie in quite well with the fragmented nature of the peninsula. The coastal basin of Loutra may very well have contained an EB II settlement also, as could the internal Throni basin, where the only EB II evidence consists of 003, a probable tool production site. Despite the lack of significant patterns, all EB II settlements are characterised by at least three of the five variables found to be significant in FN-EB I, once again suggesting that EB II communities were exploiting their environment to the full.

The two site/population trends suggested above reflect two very different potential forms of settlement development on the peninsula in the FN-EB I and EB II. We could be seeing an introduction of communities onto the peninsula in the late FN, that was followed either by partial abandonment or a change in settlement pattern from a dispersed to a more nucleated one at the end of EB I or in early EB II. Figure 6.29 shows potential population growth for FN-EB I at an annual growth rate of 0.1% and 0.2%. The starting figure was set at 20% of the average un-weighted population numbers, assuming that all large settlements date to FN-EB I. EB II has not been included because it is assumed that in this case the populations would have reduced dramatically, as reflected in the number and size of EB II settlements. Figure 6.30 shows potential population growth for FN-EB I and EB II at similar annual growth rates. This time the starting figure was set at 20% of the average un-weighted population numbers, assuming that all large settlements date to EB II. Constant 0.1% and 0.2% annual growth rates are probably too low and too high respectively. The similarity in population numbers between the two phases suggests that the demography of the peninsula was far more complex than this, and that if the EB II sites are really as few as the data suggest, there must have been some degree of abandonment during this phase. It seems quite possible that at least some of the large settlements date to EB II, particularly in the case of 108, which could indicate a slight shift of location from site 105.

The presence of only one settlement in EB III may be part of the more general phenomenon of site decrease observed more widely in the Peloponnese, whether this is genuine or a result of identification issues. If we are seeing a genuine settlement pattern, it is interesting that site 010 is situated in one of the best locations on the peninsula, a defensible acropolis commanding one of the largest coastal basins on the peninsula and in close proximity to the Vathy harbour, as well as another one or two possible inlets at even shorter distances. It is also one of the largest settlements on the whole peninsula, though the definite EB III material does not cover the overall FN-EBA extent of the site. If anything, the amount of EB III material recorded on the site may in fact reflect reduction in site size. There is no evidence to suggest that site 010 expanded to such an extent that it was able to absorb the EB II population of the peninsula (Mee & Taylor 1997: 52), in which case it seems that Methana was abandoned to an overwhelming degree. Following EB III, MBA Methana consisted of four sites in total, of which only site 010 is certain (Mee & Taylor 1997: 51-52). The peninsula does not seem to have recovered until the LBA, and even then the distribution of sites was not as extensive as in the early stages of the FN-EBA (Mee & Taylor 1997: 52-53).

A final point to make is the location of site 010 on the west coast that faces the Peloponnese, raising questions as to the potential links of the settlement with the surrounding regions, which would have been essential for the viability of Methana's population. This brings us to the issue of geographical marginality and its relevance to Methana. Its peninsular form, connecting to the Peloponnese only by a rocky isthmus, suggests that accessibility may not have always been easy (cf. section 6.2). Its location in the Saronic Gulf, surrounded by the Peloponnese, Attica, the islands of Aegina and Poros, and even the Cyclades further afield, suggests the potential for integration with the wider southern Aegean, and the archaeology does highlight interactions at varying levels across the sea with all these neighbours in different periods (Mee & Forbes 1997a), as well as the strategic importance of the peninsula in times of political turmoil (cf. Mee *et al.* 1991: 223 for the use of Methana as a naval base in the 3rd century BC by the Ptolemaic fleet). The FN-EBA pottery is believed to indicate contacts with the Saronic Gulf; similarities have also been observed between the Methana RCGR fabric and fabrics in the southern Argolid (Mee & Taylor 1997: 44, 54), and it has been suggested that the ceramic traditions from this area also have closest affinities with the Saronic Gulf rather than the Peloponnese (Pullen 1995). The fact that the only known EB III site is located on the west coast may be indicative of links with the Peloponnese rather than Attica or the Saronic islands, or may simply suggest that the area of Palaiokastro was preferred for its subsistence potential, harbours and defensibility, as mentioned above. Of course, as discussed earlier, we cannot be certain that there was no EB III settlement in Loutra, the only other micro-environment really matching that of Palaiokastro. It is possible that Methana's location on the edge of two cultural spheres may have allowed its communities to interact with both according to their needs and the available communication networks.

Returning to the agricultural potential of Methana, it is clear that the peninsula's climate and overall steep and thinly covered terrain, interrupted only by limited and fragmented areas of gentler slope and water-retentive deeper soils, could easily be characterised as environmentally marginal, particularly when compared to areas such as the Troezen plain and many parts of the southern Argolid. In 1819 Dodwell wrote: 'Cultivation prevails only in a small part of the promontory, but particularly in the plain where the ancient city stood, and at the base of the hills; which like Delphi, and many of the islands of the Archipelago, consist of strips and patches of arable land, or vineyards, supported by terrace walls, but of which none exhibited any indications of antiquity. The rest of this mountainous promontory consists of sterile desolation, or of volcanic rock of a dark colour, which is occasionally variegated with shrubs and bushes' (Dodwell 1819: 280-281). James and his colleagues rightly rejected the likelihood that settlement activity and successful crop farming would have taken place on the steeper and rockier slopes without their modification e.g. through terracing (James *et al.* 1994: 410; James *et al.* 1997: 27). Methana has a long history of settlement with particular focus on the pockets of agriculturally favourable land. Impressive rural landscapes dating to the Classical, Hellenistic and Roman periods corroborate this (Mee *et al.* 1991; though phases of dispersal and nucleation are observed during these periods also; Mee & Forbes 1997a).

The fragmented terrain in combination with the peninsula's available resources suggests small-scale mixed farming as the most viable subsistence strategy. The available soils would have been too thin in most cases to justify the use of the plough, and although, under a strict horticultural regime, the total area of potentially good agricultural land on the peninsula would have been sufficient to cover the needs of the suggested number of households, it is unlikely that the same would apply to extensive farming without terracing of some of the steeper slopes. The recovery of isolated FN-EBA sherds from at least six multi-period sites in the mountains and small components on 117 and 118 is puzzling from an agricultural perspective (the preservation levels of the material do not allow a more precise dating of either site within the FN-EBA). The altitude of the two sites and their surrounding areas (500-700m) is likely to have discouraged the production of crops, although they are both located on the edge of small patches of gentle slope (ca. 7 ha in both cases) and Mee *et al.* (1991) have observed the exploitation of such basins up to recent times. Other agricultural sites, storehouses and occasional settlements have been identified in the mountains, dating mainly to the Classical, Hellenistic and Roman periods. Olives have not been planted above 400-500m in modern times because of their poor production yields above such altitudes, but there has been cereal cultivation (Forbes 1982: 246; Forbes 1994: 194; Mee *et al.* 1991: 225, 228). The limited FN-EBA material might suggest other human activity, i.e. such as hunting, rather than permanent settlement. Alternatively, it is possible that these two sites, along with the remaining isolated finds, indicate some form of pastoralist activity that took advantage of the mountains' seasonal springs. Despite the fairly short distances, the terrain is difficult to traverse and therefore shelters in locations such as 117 and 118 would have been very useful. The use of non-cultivated areas for grazing across the peninsula has been suggested for the Classical to Roman periods, particularly as sites tend to be located in close proximity to areas of lesser as well as greater agricultural potential, something which has led Forbes to suggest an emphasis on pastoralism within a mixed farming strategy for part of these periods (Forbes 1994: 195-196). FN-EBA sites are predominantly lowland, but do combine cultivable areas with non-cultivable areas that would have provided a range of wild resources and also potential grazing land. It is clear, however, that although pastoralism may have formed part of FN-EBA subsistence strategies, the broken-up terrain of Methana could not have allowed for large-scale pastoralism.

Finally, subsistence strategies would have had to incorporate the peninsula's irregular water supply. The scarcity of fresh water sources means that communities would have been dependent on rain for farming, livestock and domestic consumption. Interannual variability and the localised climatic conditions would have had serious impact on their survival. Extended droughts and resulting crop failure could have crippled households, and rain shortage over the wider northeast Peloponnese would have been far more detrimental for Methana than the surrounding regions, such as the Troezen plain and the southern Argolid. A potential decrease in population numbers in EB II could have been the result of a long period of drought and continuous crop failure, causing part of the population to move out, though this can only be considered tentatively. Ethnographic work by Forbes in the 1970s has shown that modern populations have dealt with the localised variability in soil moisture and acidity by exploiting tiny plots of land scattered across the landscape in a variety of eco-niches to buffer against crop failure (Forbes 1976; 1982; 1997a: 116). A strategy along similar lines may be worth considering in the context of the FN-EBA Methana, though it would be impossible to identify in the archaeological record. Such strategies, however, do highlight the fluidity of settlements' wider activity areas. The need to look beyond the site centres and site scatters makes the use of some form of catchment areas necessary. The 150m radius explored here has made the analysis consistent with Kythera, where there is limited empirical evidence that this is an appropriate size. Clearly, larger settlements will have required larger wider activity areas than those investigated; however, the ones used have succeeded in showing up some key features of Methana's FN-EBA rural landscape.

CHAPTER 7

Northeast Peloponnesian landscapes in the Final Neolithic and Early Bronze Age: The Fournoi Valley

7.1 The archaeological background

The Fournoi Valley is located on the west coast of the southern Argolid, looking onto the Argolic Gulf. The southern Argolid consists of several small valleys, basins, and plains, a long folding coastline with numerous inlets, bays and a few well-protected harbours, and a number of small islands just off the coast (fig. 7.1). These islands have had varying links with the southern Argolid mainland throughout the past, depending on changing socio-political and economic conditions at different periods (Jameson 1976: 77). The Fournoi Valley constitutes by far the richest area of the southern Argolid, and was probably the most densely populated during the EBA, containing the largest and one of the most long-lived sites.

The southern Argolid has been a focus of interest for historians and geographers since antiquity; a detailed list is presented by Jameson *et al.* (1994: 3-7). Explorations in the 19th and early 20th centuries concentrated on the geography of the area and on identifying ancient sites, such as Kastri at Ermioni, Eileoi at Iliokastro, Mases in Koilada, Halieis at Porto Cheli and Didima, described by Pausanias and other ancient scholars (Aldenhoven 1841; Bursian 1872; Curtius 1852; Gell 1810; 1817; Miliarakis 1886; Puillon Boblaye 1835). In the Fournoi Valley in particular, it is the location of Philanorium that has attracted attention, along with the site of 'the Bolei', described by Gell (1810: 133) as 'heaps of large selected stones' (this is probably site F32, which dates to the FN-EBA). These first investigations were followed by further historical, ethnographic, geological and botanical research in the region (e.g. Faraklas 1973; Forbes 1993; Forbes & Koster 1976; Gavrielides 1976; Hope Simpson 1965; Hope Simpson & Dickinson 1979; Jameson 1976; Sheehan 1979), as well as by excavations, such as those at Franchthi Cave and Halieis (Jacobsen 1969; 1973a;

1973b; 1987-2000; Jacobsen & Van Horn 1974; Jameson 1969; Pullen 2000; Rudolph 1974; 1984; Rudolph & Boyd 1978; Rudolph & Sheehan 1979), resulting in the identification of prehistoric and later material across the peninsula.

To recapitulate the southern Argolid survey methodology, the whole 12sq.km of the Fournoi Valley was intensively tractwalked in the 1979-1982 field seasons. Walkers were 5-15m apart depending on visibility and walked linear tracts following field shapes unless in open country. The recording of tract material and features did not always include artefact counts and there is no indication that material was collected for later study. Sites were investigated in the course of fieldwalking. Site-based collection took the form of samples at set intervals along four axes from a notional site centre, followed by grab samples from each of the areas separated by the axes, concentrating on diagnostic feature sherds and lithics. In cases of large sites, 16-32 10sq.m samples were collected along random radii and at random distances from the site centre. Site edges were defined when sherd density reached 1 per 10sq.m. Sites located originally in 1972 and the more uncertain sites located during 1979-82 were revisited for verification. In most cases on-site and off-site were easily distinguishable. Finally, the study of the pottery involved only a macroscopic analysis of diagnostics and fabrics. It is not clear from the publication how the project then dealt with off-site distributions.

The sites known from earlier investigations were explored during the Argolid Exploration Project (AEP) and were incorporated into its publications. Any site with FN or EBA material from the Fournoi Valley has been included in the current research. The chapter is roughly laid out along the lines of the chapters for Kythera and Methana (Chapters 4-6). As in the case of Methana, the methodological details have been omitted to avoid repetition. The term 'Helladic' is used solely for the description of archaeological material; the more generic term 'Bronze Age' is used when discussing the EBA phases. The chapter begins with an introduction to the environment of the Fournoi Valley and the southern Argolid more generally, and then continues with an assessment of the valley's geomorphology, its impact on the archaeology and the nature of the archaeological material itself. FN-EBA archaeological remains are then explored in terms of their site status, their chronology, size and function, taking into consideration the observations made during a visit to the area by the author in 2003. This is followed by detailed analysis of the FN-EBA landscape (EB III has been excluded from the analyses because there are only three artefact scatters with EH III material, of which only two have been attributed site status). The final section explores the results and their implications for the FN-EBA in the Fournoi Valley.

7.2 The environmental setting

The Fournoi Valley covers an area of ca. 12sq.km and constitutes one of a number of coastal valleys and plains in the southern Argolid (fig. 7.2). It is flanked to the north by hills rising up into the internal Didima basin, to the east by the hills and gorges that lead to the Iliokastro plateau and to the south by the hills that separate it from the Koilada plain and the valleys of Loutro, Kranidi and Ermioni (fig. 7.3). The valley itself is ca. 8km long and on average 1.5km wide, interrupted occasionally by small hills or knolls, the most prominent of which are located 2-3km in from the coast and almost divide the valley in two. The mountainous terrain surrounding much of the valley has meant that until recently access to some neighbouring regions (particularly the north and northeast parts of the Akte and beyond) would have been easier by sea.

The **climate** of the southern Argolid is described as one of the driest and warmest in Greece (Jameson *et al.* 1994: 17; van Andel *et al.* 1986: 107; van Andel & Sutton 1987: 3-8). Humidity is quite high during the summer months, whereas the annual rainfall in Fournoi was measured at 520mm from September 1971 to September 1972, which was regarded as normal (figs. 7.4 & 7.5; Gavrielides 1976: 143; Jameson *et al.* 1994: 157). It has been suggested that the extensive exploitation of the southern Argolid, especially of its water sources, has contributed to its increasing aridity since the Bronze Age (Jameson *et al.* 1994: 171).

The mountain **geology** flanking the valley along the north and south consists of hard grey karstic limestones, whereas the valley bottom consists of 'ophiolites', described as 'serpentinised mafic igneous extrusive rocks; pillow lavas, tuffs and intercalated thin limestone layers' (fig. 7.6; Vitaliano 1987a; 1987b: plate 1). In this particular case, ophiolites, the local bedrock unit, have formed some very deep and fertile soils. The various small hills in the valley are limestone outcrops coming through the ophiolites. Late Quaternary deposits can be found in the coastal areas of the valley to the west (Jameson *et al.* 1994: 16-17, 153-157). Other geology in the vicinity includes small deposits of iron pyrite and chalcopyrite in the Iliokastro area, which have been exploited in recent times (Aranitis 1961; Jameson *et al.* 1994: 17), as well as several sources of flint and chert across the southern Argolid (Kardulias & Runnels 1995: 77), such as site F25 in the Fournoi Valley area.

Natural springs of good quality, or at least evidence of their presence in the past, can be found scattered along the edges of the valley at the contact points between the permeable limestone and the impermeable ophiolites. Although today they are rather limited because of modern wells that tap into the sources, there would probably have been a greater number and with greater water flow in the past; some of the springs that are now underwater just beyond the coast are thought to have been good water sources when they were still on dry land (Harper 1976: 49; Jameson *et al.* 1994: 17, 156, 169-170; van Andel *et al.* 1980: 400; van Andel & Vitaliano 1987). There are no perennial streams flowing through the valley, although there are some further up in the Iliokastro basin and the Adheres Mountains. The valley streambeds serve more as outlets for winter floods. The areas with the now submerged marine springs on the coast may have contained accessible and consumable water sources in prehistory, when the shore was further out to the west. Due to their nature these springs are dependent on rainfall levels.

There are no good **natural harbours** directly linked to the Fournoi Valley, though the southern Argolid as a whole is characterised by several protected coastal inlets and coves, including Koilada, Porto Cheli and Ermioni. Although it would be tempting to suppose that the bays either side of Agios Ioannis, particularly the north one which forms the outlet of the Fournoi drainage area, may have once been inlets that have now been filled, detailed investigations of the erosional and alluvial processes as well as of sea level changes during the survey have indicated that the FN-EBA coast of the Fournoi Valley was probably further west than the present (fig. 7.6: ca. 500m towards the end of the FN and gradually shrinking to ca. 300m by the end of the EBA, on the basis of maps by Jameson *et al.* 1994: 202, 208; van Andel 1989), suggesting land lost to the sea rather than the other way around (Jameson *et al.* 1994: 195). In 3000 BC, Koronis Island would still have been attached to the Mainland, but the Koilada inlet would have already started to form in the preceding 2500 years (van Andel *et al.* 1980). The impressive amounts of fish and shellfish debris at Franchthi cave have also highlighted the importance of the sea as a major subsistence source, at least during certain Neolithic periods, such as the Late Neolithic (Shackleton 1988).

7.3 Measuring the integrity of artefact assemblages

7.3.1 Geomorphology

The geomorphological investigations that took place as part of the AEP brought to light detailed information regarding the erosional processes on the peninsula. The Late Quaternary is marked by at least seven alluvial phases alternating with phases of soil formation. Four of these occurred during or after the EBA (Jameson *et al.* 1994: 172-189; Pope & van Andel 1984; van Andel *et al.* 1986). All four are found in the Fournoi drainage system (Pikrodhafni, Lower and Upper Flamboura and Kranidi Alluvia). Colluvial deposits are also widely spread across the Fournoi valley.

When assessing the spatial relationship between the survey sites in the Fournoi Valley and the relative soil loss map, it appears that two of the 27 mapped sites with FN-EBA material (definite and possible pottery and/or lithics) are located in areas of greater soil loss; the majority are located in areas of relatively low erosional movement (fig. 7.7). When compared with the total number of sites the results are similar. When these observations were tested against the tractwalked area, no statistically significant patterns emerged (at $p < 0.05$), although there were slightly more sites than expected in the lower soil loss category, which is highlighted in figures 7.8a-b. It should be noted that, as in the case of Methana, the tractwalked area overall has undergone only medium to low relative soil loss. Therefore what the statistical testing has revealed is that although 91-93% of FN-EBA and total sites have relative soil loss values of 0-20 (100 represents the maximum movement of soil out of a single cell in the study area), so does 84% of the tractwalked area. The above suggests that overall, areas more susceptible to soil loss and therefore with higher potential for smeared, destroyed or completely lost sites are mostly outside the tractwalked area. It will become apparent in section 7.5.2 that there is relatively little tractwalked area in high altitude (90% is below 200m) or with steep slope (ca. 70 % is less than 13°), so soil loss will also be limited.

Soil deposition, however, has been fairly extensive. The alluvial phases have contributed to the formation of good agricultural soils for later settlements, but at the same time they are likely to have covered part of the FN-EBA landscape (fig. 7.9). Based on the geology/soil maps by Pope & van Andel (1984) it appears that 16 of the 45 sites identified during the survey and nine out of the 27 mapped sites with FN-EBA material are located in areas with alluvial soils (33.3% and 34.6% respectively). These proportions are greater than those of both Kythera and Methana, which in fact have a lower percentage of area covered by alluvial and colluvial deposits in their tractwalked areas compared with the Fournoi Valley. It is interesting that most of these FN-EBA sites have substantial material. The geomorphological investigation has shown that no FN-EBA material has been identified as sitting stratigraphically on top of alluvial deposits, but only within them (Pope & van Andel 1984); the visibility of the sites is therefore most probably the result of ongoing erosional processes, local soil depth and also subsequent intensive land use (e.g. deep ploughing). Six of the FN-EBA sites are located in fields that in 2003 had evidence of ploughing (F7, F13, F18, F19, F32 and F58); F9 is on terraces, the construction of which may well have brought material to the surface; F1 was mainly found in a section and F6 is located on a small knoll and its slopes. Furthermore, site F32 is the largest and densest scatter of the whole tractwalked area. Although heavy cultivation can lead to the destruction of sites, it appears that here, at least in some cases, it has helped to expose them in the short-term. Although the reliability of surface scatters may have been compromised by geomorphological processes in the valley and its surrounding hills, it is comforting to see that it is still possible to identify sites even in the more problematic areas. The areas where sites are more likely to have been missed include the lower valley towards the coast, other smaller pockets possibly closer to stream beds and areas that are less exposed to ploughing and other intensive forms of land use. The locations of 20 Fournoi FN-EBA sites were revisited as part of the current research (cf. section 7.4.2). Only two sites could not be relocated (F49, a ridge-top site possibly succumbed to erosion, and F23, a site on terraces, probably destroyed by bulldozing and construction), whereas discrepancies were observed in the sizes of some of the scatters compared to those recorded during the survey: some sites are now smaller than before, whereas some are larger. This does suggest that in some cases land use has had an impact on the overall site integrity. Nevertheless, a remarkable consistency was observed in several of the scatters, which implies that this impact has been localised. Furthermore, the relocation of 18 out of 20 sites in 2003 suggests that the phenomenon of sites appearing and disappearing is not a characteristic of the Fournoi Valley, at least not in the last two decades.

7.3.2 Archaeology

The archaeological material used to date FN-EBA sites consists primarily of pottery, as well as chipped stone. The descriptions that follow are relevant to the overall southern Argolid assemblage, and not just to the Fournoi material. FN pottery is limited, consisting primarily of coarse or semi-coarse fabrics with calcium carbonate inclusions, or no inclusions at all. They tend to be unevenly fired with dark cores and are sometimes burnished and/or with plastic decoration. Some pottery has a combination of FN surface treatment and EH I fabric characteristics, or *vice versa*. These are thought to date to the late FN and/or early EH I (Pullen 1995: 7-10). Three EH I fabrics have been identified in the survey area: the ones more specific to the southern Argolid have red-orange gritty clay with quartz inclusions (sometimes with lime), or quartz and volcanic mineral inclusions (rarely with lime). The third fabric has no quartz or volcanic minerals, though it can have lime or silver mica. It is more unevenly fired and has affinities with pottery from the northern Argolid and Corinthia. The EH I-II sherds fit into the third group, as do the so-called EH I: Blegen Class A. The most typical surface treatment and decoration for EH I pottery is a thick red slip burnished to a high lustre (Pullen 1995: 11-12). The first two fabrics (particularly the second one) and this surface detail appear to be very similar to the 'rather coarse gritty reddish' ('RCGR') found on Methana and are described as highly durable and diagnostic . The uneven firing and darker cores of the FN pottery suggest a less durable group of material that perhaps has lower preservation rates than the EH I. EH II in the southern Argolid encompasses a wide variety of fabrics, of which three types are more marked. The first is a semi-fine, hard and often unevenly fired fabric with a yellow-blue slip and burnish, the second a semi-coarse fabric known as 'Corinthian green' and the third type consists of the first two EH I fabrics that are found with EH II shapes (there are only a few examples of these). The most common surface treatment for finewares is Urfirnis (Pullen 1995: 20). The first fabric is described as more 'brittle' and tends to be found more fragmented. This has implications for its recovery rates, suggesting, on the one hand, that it is less likely to survive and, on the other, that when found in larger quantities it does not necessarily imply lots of pots. EH III pottery is limited: it was identified on just eight sites across the southern Argolid, though remarkably, three of these are located in the Fournoi area. The fabrics range from fine to coarse; no local fabrics were identified, instead they have affinities mainly with the Argive plain (Nordquist 1995: 43-45).

Obsidian and/or chert were found on 18 FN-EBA sites in the Fournoi Valley. There is a strong association between chipped stone and Neolithic/Bronze Age sites throughout the southern Argolid, though it is also found on sites dating to earlier and later periods (Kardulias & Runnels 1995: 74, 84-85; Van Horn 1980). Obsidian specifically was found on 14 out of the 24 Fournoi sites with definite FN-EBA sherds (just under 60% - note that this also includes site F16 which was not re-located after 1979). Another five sites with no FN-EBA pottery have possible FN-EBA obsidian (of these sites F22 and F30 were not re-located after 1979). Although Van Horn (1980: 489) has suggested that conical cores date to the Neolithic whereas tabular cores normally date to EB II, this has been argued against in the case of the southern Argolid specifically (Kardulias & Runnels 1995: 77). Ground stone is also found in all prehistoric contexts, but has also been used throughout historical times (Kardulias & Runnels 1995: 74). FN-EBA materials mainly involve andesite, sandstone, and serpentine and basalt, and these were used for the production of saddle querns, handstones, celts and mortars. They have rarely been dated to specific phases of the FN-EBA, though the Fournoi Valley does have the largest amount of identified EH II mortars from the survey, mainly from site F32 (Kardulias & Runnels 1995: 109-139; Runnels 1988).

7.4 Defining the FN-EBA dataset: size, chronology and function

7.4.1 The FN-EBA dataset

A total of 328 scatters were registered during the southern Argolid Survey, and 50 of these are located in the Fournoi Valley and surrounding hills. Detailed study of the FN-EBA material recovered during the survey has highlighted settlement patterns for all FN-EBA phases (Kardulias & Runnels 1995: lithics; Nordquist 1995: EB III; Pullen 1995: FN-EB II) and a description of each site has also been made available (Jameson *et al.* 1994; Runnels & Munn 1994). Two thirds of the Fournoi FN-EBA sites were visited as part of this research to explore their FN-EBA components and, where possible, their scatter size. The assemblages of 24 sites include definite FN-EBA pottery. Another five sites include possible FN-EBA obsidian, and one site has a possible EH II mortar made of andesite. A detailed list of sites with pottery and lithic counts is presented in table 7.1. Four of the 30 sites mentioned were originally identified in 1972, but were not relocated or verified (F16, F22, F26 and F30). Attempts to relocate site F22 led to the identification of another lithics site in the vicinity, which has been marked on some of the survey publication's maps (Jameson *et al.* 1994). Unfortunately, as in the case of Methana, no detailed tractwalking data is available for the investigation of the wider FN-EBA landscape.

7.4.2 The exploration of FN-EBA sites in the Fournoi Valley in 2003

Fournoi Valley sites with an FN-EBA component, identified during the AEP, were revisited by the author in the summer of 2003, with permission from the 4th Ephorate of Prehistoric and Classical Antiquities at Nauplion. The main aims of the visit were to relocate the FN-EBA sites, to establish a more phase-specific extent where possible and to explore the relationship between the sites identified in a cluster half way up the valley (the Fournoi Focus; Jameson *et al.* 1994: 348-366). The exploration was preceded by a study of the published survey material at the Nauplion Museum and the published material from Lerna at the Argos Museum in order to become familiar with local FN-EH I and EH II shapes and fabrics and to recognise them in the field. The AEP publication maps were used for the relocation of the sites. Once a site was identified, its full extent was estimated by walking up and down in parallel lines ca. 1.5m apart. When material was observed, it was examined *in situ* before continuing along the walker path. Material was noted in terms of shape, fabric (where visible) and possible date. The area was further assessed in terms of surface visibility and any local disturbances, such as soil erosion, cultivation, bulldozing, new constructions, and anything else that would have affected the integrity of the site. The definition of site size was discerned for each FN-EBA phase wherever possible, and scatters were plotted onto 1:5000 Greek Army maps of the area (cf. section 7.4.4).

The locations of all 20 Fournoi Valley sites that were dated to the FN-EBA on the basis of pottery and which are described in the main section of the publication site register (section A.2 in Runnels & Munn 1994) were revisited (18 were relocated). Sites omitted were those that could not be relocated in 1979-1982 (F16, F22, F26 and F30), as well as sites with a negligible FN-EBA component (F3 and F54), with little or uncertain FN-EBA lithics (F2 and F25) or with uncertain BA lithics (new F22 and F51; F8 was visited). The omission of lithic sites was partly due to my insufficient knowledge of FN-EBA lithics, but overall time constraints made it important to focus on sites with a definite FN-EBA component.

The last column of table 7.1 presents a summary of the observations made in 2003 for each site and the number of sherds definitely dated to each phase. As a general rule it was expected that, all things being equal, less FN-EH material would be identified from each site in 2003 than during the survey because of the conditions of study, i.e. the observation of unwashed material *in situ* within a tight temporal framework (an average of three hours was spent on each site). Clearly other issues also come into consideration, such as the extent to which a site may have been depleted by the collection of material during the survey, whether more material has been brought to the surface since the survey, and the impact of human and natural processes on site integrity in the last 20 years, since the end of the survey. Sites F23 and F49 revealed no material despite intensive exploration of the areas. F6 was fenced off with a house on the top of the knoll, and although the owners were there at the time, part of the knoll was being bulldozed and it was deemed prudent not to interfere (other than this, the villagers of Fournoi were extremely helpful in providing information on the location of sites and allowing access to their gardens and fields). Material was found at all other sites, though F14 and F29 provided no FN-EH diagnostics; both sites produced a tiny concentration of FN-EBA sherds during the survey, and it is possible that the function of F14 was more as a lithics quarry than a settlement. The limits of site scatters were generally easy to define. With the exception of F19, which was partially fenced off, all other sites with unclear limits had suffered considerable disturbance by modern construction and landscaping, or even depletion through the illegal collection of material (I was told this by a number of locals, particularly with reference to site F45). Greater EH II sherd quantities than during the survey were observed at sites F7, F13, F15 and F18 (however, not always equating with greater site extent). During their investigation in 1979-82, the sites were located in fields with cereals and sometimes olives. In 2003, most of the fields had been deep ploughed and visibility was good, which may explain the difference in the amount of material observed. Furthermore, the material on site F15 may partly originate from the area of F17 just above it, which has undergone considerable modification in the last few years. No EH III material was observed on any site. Observations dealing with chronology, size and function have been incorporated in the relevant sections that follow and, except for cases where the integrity of sites appears to have been compromised in the last 20 years, supersede those of the survey for present analytical purposes.

7.4.3 Site chronology

Table 7.2 shows the FN-EBA phases present at each site and their component values in each case. Based on the classifications of material in section 7.3.2, the Fournoi Valley produced ten FN-EB I sites (plus seven with negligible/possible material), 16 EB II sites (plus seven with negligible/possible material) and two EB III sites (plus one with negligible material) (figs. 7.10 & 7.11). Component values are based on the proportion of FN-EBA material compared to other periods, the volume of material – mainly pottery, but also lithics – and the likelihood of each scatter representing a site.

Figure 7.10 also shows the number of sites weighted by century. This suggests that the number of EB II sites is 4.8 times greater than that of FN-EB I sites per century. Although FN and EB I sites have been grouped together for the sake of consistency with the other two surveys, there are in fact only 3 registered definite FN sherds in Fournoi, which have been found on sites with early EB I (F9 and F14). Another two sites have FN-EB I sherds, which are thought to date to the late FN or early EB I. It seems likely that these sites date to the end of the FN onwards, and it would be more realistic to weight the sites by 700-800 years and not 1500, as was suggested for Methana. In this case the number of EB II sites would be 2.4 times greater than that of FN-EB I sites per century. In both cases there appears to be a dramatic decrease in site numbers in EB III, which, when weighted, is represented by one site per century. Continuity or repeated occupation of certain sites is suggested by the presence of both FN-EB I and EB II material on six sites, and two of these (F5 and F6) are the only sites with definite EB III material in Fournoi (figs. 7.12 & 7.13).

Site F49 contained only one sherd from Pullen's EH I-EH II category (Pullen 1995: 313) without having any clearly EH II material; all other sites with EH I-EH II also had EH II sherds, suggesting that the chronology issues concerning Methana are not relevant to the Fournoi Valley.

7.4.4 Site size

Site size was estimated on the basis of the information in the AEP publication and personal fieldwork. Similar problems to those at Methana were encountered here, with regard to the estimation of a single size for multi-period sites and the impact of poor site integrity on size estimation. Re-visitation was partly aimed at resolving these issues.

During the survey, the total size was estimated for 14 sites; the integrity of the remaining six had been compromised by human and natural processes. The 2003 fieldwork resulted in the estimation of size for individual FN-EBA sub-phases on nine of these 14 sites (tables 7.1 & 7.2): six are only FN-EBA (F7, F9, F13, F15, F18, F20), one is predominantly FN-EBA (F32 – 80% of total assemblage), and two are multi-period (F21, F58). On the one hand, the strikingly low number of multi-period sites highlights the impact that subsequent occupation can have on FN-EBA assemblages and, on the other, it makes possible the investigation of the way in which sites may have changed over a period of 20 years. Sites F7, F13 and F20 have remained at similar extents (within 300sq.m), whereas sites F9, F15 and F32 are now 0.1-0.3 ha smaller. Sites F15 and F32 are adjacent and probably part of the same settlement. The boundary between them was difficult to define and, given the fact that F17 (also adjacent to both sites) has been greatly modified, any discrepancies here may be the result of shifting boundaries. The difference between 1979-82 and 2003 is most marked in the case of site F9, which now covers only 40% of its original extent. Over-ploughing or extremely low regeneration rates may have caused this reduction in size. Of course such a discrepancy could potentially be the result of differing notions on what constitutes a site edge, something that cannot be examined with the available data. What is interesting is that the three remaining sites, F18, F21 and F58 were found to have greater total site extents in 2003 compared with the 1979-82 observations, and even more strikingly, this category includes the only two multi-period sites. Varying land use in different seasons is also likely to have affected the presence of material and its visibility on the ground surface.

Sites F17, F19 and F6, three of the five sites that could not be assessed for size in 2003 but were in 1979-82, are solely or at least predominantly EB II (Pullen 1995; Runnels & Munn 1994); the total size assigned to them in the survey publication has therefore been accepted for the EB II component in the current analysis. Both F17 and F6 also have a smaller FN-EB I component; the small number of FN-EB I sherds present on F17 suggests a minimal site size, but the site extent of F6 is less easy to define. The presence of albeit only a few late FN-early EB I sherds makes it one of the earliest known sites in the valley that continued to be occupied throughout the third and into the 2nd millennium BC, and it may have been of considerable size even in EB I. This is impossible to verify, but such a possibility will be taken into consideration in later discussions. Sites F4 and F23 have only minor FN-EBA components and have therefore been give the minimum site size. Minimum site size has also been attributed to FN-EB I sites F45 and F49, which are described as 'small' and 'very small' respectively (Runnels & Munn 1994), and to F14 and F29, which have very small assemblages and undetermined extent. Sites F1 and F5 are a little more problematic, because they have considerable amounts of FN-EBA material but no spatial resolution because of their location in the modern village of Fournoi (F5 has also been described as 'small' in Runnels & Munn 1994).

Table 7.3 and figure 7.14 show absolute site sizes and ranges in each phase of the FN-EBA, whereas FN-EB I spatial distributions are presented in figure 7.15. Jameson *et al.* (1994: 348) described the concentration of EB I and EB II settlements north of modern Fournoi as the *Fournoi Focus*, covering an area of ca. 10 ha. It seems very probable that sites F6, F15, F17 and F32 were indeed one site, arbitrarily divided in 1979-82 as a result of modern field boundaries. However, these four sites together do not cover an area of 10 ha, unless sites F18 and F19 further south are also included. Intensive fieldwalking across the areas between the F6/F15/F17/F32 cluster and its neighbouring sites (F13, F19 and F21) produced no significant concentrations of material that would suggest that these sites were all part of a larger settlement. The F6/F15/F17/F32 cluster itself covers an area of ca. 4.5 ha, a considerable size nevertheless, but less than half the initial estimate. Furthermore, there is no evidence to suggest that there was an FN-EB I site covering 4.5 ha, particularly since the central site (F15) produced no FN-EB I material. In this study therefore, the term Fournoi Focus is applied only to the EB II F6/F15/F17/F32 cluster, and all analyses carried out on EB II sites have explored this cluster both as separate sites and as one large site (fig. 7.17). The close proximity to each other of EB II sites F18 and F19 (only divided by the main Didima-Kranidi road) suggests the possibility that these also formed one site; these too have been treated separately and as a single site.

Only three out of the ten FN-EB I sites have a secure site size, two of which are larger than 0.1 ha (0.2 and 0.35 ha). Although another three sites have been described as 'small' or 'very small', it is not clear what this means exactly, particularly since the range of sizes across the southern Argolid is wide, with several sites covering areas of 2-6 ha (Runnels & Munn 1994). The largest FN-EB I site is F32, which is located in the middle of the Fournoi Valley and forms part of the EB II Fournoi Focus. Figure 7.16 shows the distances of all other FN-EB I sites to F32, suggesting a loose concentration of a few sites around F32, but overall a fairly scattered distribution along the valley. In EB II, with the exception of two coastal sites (F4 and F7), there was a marked concentration of sites around F32 and the larger Fournoi Focus (figs. 7.18 & 7.19). The majority of EB II sites are smaller than 0.5 ha, and depending on how one looks at the Fournoi Focus, there are three 0.1-0.2 ha sites, or just one large site. The possibilities of settlement hierarchy are discussed in section 7.6 (unfortunately, there is not sufficient information regarding EB III).

7.4.5 Site function

The pottery shapes identified on FN-EBA sites have been generically classified as open or closed vessels, though wherever the preservation is good enough they have been described in more detail: askoi, basins, bowls, dippers, fruitstands, frying pans, hearths, hydriae, jars, jugs, ladles, pans, pithoi, pyxides, rooftiles, sauceboats, saucers, scoops, spindle whorls and stands (Pullen 1995; Runnels & Munn 1994). Items such as bowls, jugs, sauceboats and saucers indicate food consumption, basins, ladles, scoops, and dippers may indicate food preparation and pithoi, jars and askoi may indicate storage (closed shapes may generally fit into this category also). Textile production is indicated by the presence of a spindle-whorl, whereas the presence of hearths and rooftiles suggests substantial residential structures. The presence of most of these can be used to suggest settlement status for 2-7 FN-EB I and 11-16 EB II sites. Table 7.4 shows the ceramic shapes present on each FN-EBA site and the presence of obsidian or ground stone (suggested function is included in table 7.1). Contrary to Methana, the groundstone here dates specifically to FN-EBA phases. Sites F5, F6, F15, F17, F20 and F32 have the widest range of shapes, and the low pottery counts in some cases may indicate that not all shapes originally present are necessarily represented in the assemblages. Hearth fragments and rooftiles are not limited to the Fournoi Focus in EB II, but are found on F5 and F20, though both are in the same part of the valley. The abundance of obsidian or chert in the form of chips or blades on a number of sites suggests the possibility that some were either primarily tool production sites or at least part of the function of some of these sites was tool production (sites F6, F13, F14, F19, F20 and F32 - sites F22, F25, F30 and F51 may be specific tool production sites if they date to the FN-EBA). It should be noted that EH II bowls, possible basin and sauceboat fragments, as well as a conical seal, were recovered from site F16. The site is described as having been located somewhere between F6 and F14 in 1972, but was not relocated in 1979-82 and cannot therefore be included in this analysis.

The majority of FN-EBA sites are likely to be settlements, though it is possible that not all were permanent. It is probably safe to assume that settlements with the wider range of shapes, including rooftiles or hearths, were all permanent. The presence of a number of hearths with different decorations have led Runnels & Munn (1994: 513) to suggest the presence of up to 20 different structures on F32. In 2003 the owner of the modern house now built on site F17 showed me the material collected by her children from their field to the north of the house (in the area of F32). It consisted of ca. 150 sherds, mostly dating to EH II, and included fragments of bowl rims and bases, basins, jar handles and rims (including finger impressions and decorative bands), jug handles, a possible stand, two ladles and a round hearth rim with herringbone decoration, identical to a fragment described by Runnels *et al.* (1995: 186 - item 653). The Fournoi Focus, and site F32 in particular, stand out as the major settlement in the Fournoi Valley.

7.5 The FN-EBA landscape

7.5.1 Inter-site spacing

Nearest neighbour analysis was used to suggest appropriate wider activity areas for sites in each sub-phase (with the exception of EB III). The FN-EB I sites produced a rather incoherent pattern, with a possible break at 350m (fig. 7.20), but no significant patterns. The EB II patterns also appeared to be quite erratic visually, but departed significantly from a random distribution. The maximum difference was observed at 250-300m, with 12 sites spaced less than 300m apart (75% of sites against an expected 24%). Only three of the 12 sites are within the 250-300m margin, whereas the remaining nine have neighbouring sites at distances that range between 60 and 250m. The significance level is possibly exaggerated by the decision to set the minimum distance between random sites at 100m. EB II sites were modified to include sites F18 and F19, and similarly sites F6, F15, F17 and F32 as single larger settlements. Furthermore, the locations of site centres were moved to the centre of any known EB II scatters. In this case the shortest distance between two sites was 153m (F1 and F21). Once again a significant pattern emerged, but this time the maximum difference was observed at 400-450m, with 10 sites spaced less than 450m apart (83% of sites against an expected 37%). The 250-300m threshold was also significant with 7 sites having neighbours less than 300m away (58% against an expected 18%). In fact the largest concentration of sites is in this category (five sites – 42%). The above results suggest two significant distances, depending on whether we take certain sites separately or as parts of larger settlements. Based on these results we are therefore provided with a 150m and a 225m radius. It was decided to explore both radii, simply because the 150m radius would provide analyses consistent with those of Kythera and Methana, and the 225m would take into the account the existence of a major site at Fournoi. It is interesting to note, however, that this site is only 284m from its nearest neighbour. One would possibly expect that a settlement as large as this would be much more distant from its neighbours, as was observed in the case of Kastri on Kythera. This is discussed further in the final section of this chapter.

7.5.2 Landform metrics

FN-EB I and EB II (including EB II modified) sites were explored against altitude (site centres), slope (wider activity areas), aspect (site centres and wider activity areas) and surface curvature (site centres). No significant patterns emerged for altitude, slope or aspect (figs. 7.21-7.24). It is worth noting that all sites dating to specific FN-EBA phases are at altitudes below 200m, but then so is 90% of the surveyed area. Slope will be discussed in more detail in section 7.5.

The sizes of the cell neighbourhoods for calculating surface curvature were set to correspond with those of the Kythera and Methana analyses: as in the case of Methana, the Fournoi map grid cells are 20x20m, so one Fournoi grid cell equals one Methana and roughly four Kythera grid cells. 3x3, 13x13, 25x25, 37x37 and 49x49 cell neighbourhoods were explored (fig. 7.25). The analysis highlighted a significant difference only for the 3x3 cell neighbourhood of FN-EB I sites. Only two sites are located in areas with surface curvature values less than 0.1 (20% against an expected 82%), suggesting that such areas were deliberately avoided. This difference remained significant as the cell neighbourhood was increased to 11x11, though the difference itself gradually decreased. The lack of significance in all other cases is intriguing, as the majority of sites are located on fairly neutral/flat (very low negative or positive curvature) or medium-low convex relief (figs. 7.26-7.28). A reason for this is the fact that much of the tractwalked area falls into the neutral/flat category (40-50% for the 13x13 and 25x25 neighbourhoods and over 70% for the 3x3). Despite the lack of statistical significance, the number of EB II sites (both modified and unmodified) tends to decrease in both directions, though much more abruptly in the 'negative'. This follows the overall pattern observed both on Kythera and Methana, where settlements tended to be located primarily on fairly neutral/flat (very low negative or positive curvature) or medium-low convex relief, while avoiding topographic features such as channels or gorges. The observation is particularly prominent for the 3x3 and 13x13 cell neighbourhoods, which cover areas of 0.36 and 6.76ha respectively (the latter being slightly under the 150m radius wider activity area). Surface curvature was explored further for the wider activity areas, but no significant patterns emerged.

7.5.3 Geology

A total of six geological categories fall into the tractwalked area (fig. 7.29):

- Limestone breccia
- Lower Cretaceous to Paleocene massive-bedded shallow-water limestone (karstic)
- Paleocene thin-bedded limestone and marls with turbidity features (mostly with alluvium)
- Quaternary alluvium

- Upper Jurassic to Lower Cretaceous ophiolites
- Lower to Middle Jurassic massive dolomitic limestone (karstic)

The area of the modern Fournoi village has not been formally assigned geological attributes, but it seems from the map that it probably consists of ophiolites, like most of the valley area. In order to keep to the chi-square test restriction, according to which only up to 20% may have under 5 expected sites and none under 1 expected site, the six categories had to be grouped into two larger categories: 'ophiolites' and 'remaining geological categories (limestones and alluvium). The results indicated a significant preference for ophiolites for EB II and the modified EB II category, but not for FN-EBI (possibly as a result of the low number of sites). 79% of FN-EB I and 92% of EB II wider activity areas were located on ophiolites against an expected 57-58%, whereas 84% of sites were located on ophiolites against an expected 55% in the modified EB II category (fig. 7.30).

7.5.4 Valley hydrology

Proximity to fresh water sources was investigated only for the site centres. The analyses highlighted a significant difference for both FN-EBI and EB II (all sites and modified). The results suggest that there is a preference for site location within 600-700m of springs for all periods: 7 FN-EB I sites (70%) and 9 EB II (modified) sites (75%) are located within 700m against an expected 27%, whereas 13 EB II (original) sites (81%) are located within 600m against an expected 23%. All sites are located within 3.2km of springs (fig. 7.31).

The hydrology of the valley was also investigated in terms of water runoff and drainage systems (fig. 7.32). As a first step, site centres were explored in relation to flow accumulation. Statistical analysis highlighted no significant differences. It is worth noting, however, that all FN-EB I sites and 75% of EB II sites are located on cells with 10 or fewer cells (0.4 ha) pouring into them, but 65% of the tractwalked area is also on such cells. Flow accumulation was explored further for the wider activity areas of the FN-EB I and EB II sites, but no significant patterns emerged. However, once again in both cases, over 70% of the total wider activity area had less than 0.4 ha draining into it (i.e. into each 400sq.m grid cell).

Watersheds were also delineated (fig. 7.33). As with Methana, the threshold was set to 175 cells. Statistical analysis highlighted no significant differences (fig. 7.34).

7.5.5 Coastal proximity

Coastal proximity was investigated for FN-EB I, EB II sites and EB II modified sites. Significant patterns emerged for EB II and EB II modified, but not for FN-EB I. 15 EB II sites are located within 4km of the modern coast (94% against an expected 54%). In the modified EB II category 11 sites are located within 4km of the coast (92% against an expected 54%). The FN-EB I pattern is the same, though not significant. However, in all phases there are fewer sites than expected within 3km of the coast (not significant). The change occurs within the 3-4km range, which includes 6 FN-EB I sites (60%), 11 EB II sites (69%) and in the modified EB II category 7 EB II sites (58%). It is probably misleading, therefore, to state that EB II sites are preferentially located within 4km of the coast (cf. section 7.5.6).

7.5.6 Interpreting the results from the data analysis

The above analyses have highlighted few significant patterns for the Fournoi Valley sites (table 7.5). Analysis of altitude, aspect, slope, water runoff and watersheds produced no significant patterns; surface curvature is significant only for FN-EB I and geology and distance to coast only for EB II; proximity to springs is the only variable that is significant for both FN-EB I and EB II. The presence of only two EB III sites excludes this phase from the analyses altogether. These results may be partly due to the relatively small number of sites present, as well as to the overall homogeneity of the valley itself, which provided too similar a background for comparison with the sites and their wider activity areas. For this reason, it is important to draw out the attributes that would have had a positive effect on the Fournoi Valley FN-EBA economy. All significant variables were explored for interdependence. There are two cases where there appears to be a relationship: slope and geology and distance to coast and springs. When geology is weighted by slope, it is no longer significant. The same occurs when distance to springs is weighted by distance to coast. In the latter case, it is more likely that distance to springs is the important variable, since the significant location of more than half the EB II sites at 3-4km and the non-significant location of only a few sites at 0-3km from the coast suggests that processes other than coastal proximity are involved.

The significance of surface curvature for FN-EB I only and for such a small cell neighbourhood (ca. 0.36 ha) suggests a focus on site location, rather than simply a preference for fairly flat land for agricultural practices. Eight of the ten sites are located on medium to high convex relief, i.e. on knolls and ridges of varying steepness. The most notable are sites F5 and F20, which also continue into EB II (F5 is also occupied in EB III). There are no sites from any phase located on strictly concave relief. What is observed in EB II, however, is an increase in sites on flatter terrain, and abandonment of some of the sites on medium relief. The possibility that any site on negative relief would have been covered or destroyed by soil deposition should also be borne in mind. The location of EB II sites indicates a significant preference for ophiolites, which are regarded as the best soils in the valley for agricultural purposes (cf. supra). Site F7 is the only site that does not conform to this pattern, but is instead located on alluvial soils near the modern coast. It should be noted that despite the lack of significance, eight out of ten FN-EB I sites are also located on ophiolites, and the same holds for both EB III sites. A significant close proximity to fresh water springs in both FN-EB I and EB II is particularly interesting: Jameson *et al.* (1994: 347-348) have suggested that Franchthi Cave was abandoned at the end of the Neolithic because of the loss of the springs in its vicinity to the advancing coastline. The majority of sites throughout the FN-EBA are within 600-700m of springs, if one assumes that spring vents have not shifted excessively since the EBA. The site furthest away from a known fresh water source is F49 (the closest springs outside the tractwalked area are in the Iliokastro area, at similar distances, but possibly more difficult to get to). As explained in section 7.5.5, the significant location of EB II sites within 4km of the coast is probably misleading: most sites are located 3-4km from the coast, which is in fact 3.3-4.5km from the FN-EBA coast, whereas only four sites are closer than this; it seems most likely that this pattern is a result of factors other than coastal proximity.

The lack of significance of altitude is not surprising since the highest point within the tractwalked area is 275m. In terms of agricultural practices at least, altitude probably starts to become important at 600-700m (cf. Chapter 6). The lack of significance of aspect also conforms to the lack of any known terraces in the FN-EBA Aegean (as discussed with relation to Kythera in Chapter 5). To fit this pattern completely, this should have been accompanied by a significant preference for gentler slopes up to ca. 13°. However, 70% of the tractwalked area has 13° slope or less. In terms of sites, 65% of wider activity areas are on 13° or less in FN-EB I, 78% in EB II and 82% in EB III. Furthermore, the valley itself has relatively little steep slope, meaning that communities would have had to travel only short distances to reach gentler slopes. The sites that stand out for having extremely little gentle slope are F14, F20, F29 and F45 (less than 35% of area on 13° or less slope), of which F29 is possibly the only one that has none in close proximity beyond the defined wider activity area (the function of this scatter is uncertain, as there is insufficient evidence to suggest it was definitely a settlement). The Fournoi Focus is of particular interest, since despite it having 100% of its 225m radius wider activity area on slope under 13°, 11 ha is too small an area to cover the needs of a 4.5 ha settlement (in any case the 11 ha include the site area).

Turning to the statistically insignificant hydrological variables, it would seem that the majority of sites are located in areas with little water draining through them (under 1 ha of surrounding land). The sites that stand out as having substantial areas draining through their site centres are F7 and F58 (note that F58 does not stand out so much when exploring the location mapped in Jameson *et al.*, but only when the site centre is placed in the middle of the EB II scatter as recorded in 2003). Overall, much of the wider activity areas are in zones of substantial water drainage, suggesting that during periods of extreme rainfall they are likely to suffer from flooding. The distance of most FN-EB I sites from watershed boundaries does not exceed 50m (excepting F1 and F14), and both EB III sites are within 20m of a watershed boundary. However, half of all EB II sites are more than 50m away (F23, F29 and F58 are more than 100m away). It is likely that watersheds in the alluvial zone have seen substantial changes.

The results have shown that although overall many of the sites in the Fournoi Valley make the most of certain of the variables discussed, at no time during the FN-EBA is the pattern as uniform as in the case of FN-EB I Methana or EB II Kythera.

7.6 Settlement patterns and subsistence strategies in the FN-EBA Fournoi Valley

The FN sees the introduction of a few small communities into the Fournoi Valley, a phenomenon which continues further during EB I. Overall, sites are dispersed along the valley, though there is some gravitation towards its middle section, which holds six of the ten sites. There are no sites on what is today the modern coast, though it is possible that any coastal FN or EB I site could be underwater now. There is no solid evidence for occupation in the valley prior to the FN; in fact, with the exception of Franchthi Cave and a handful of sites appearing in the Middle and Late Neolithic, the southern Argolid reveals little earlier settlement as a whole (Jameson *et al.* 1994: 327-348). Franchthi Cave has produced most pre-FN material and is the only site to have been occupied semi-continuously from the Upper Palaeolithic down to at least the end of the Neolithic, and possibly into EB I. Lithic scatters across Iliokastro, the Katafiki gorge area, and Koilada and Loutro have been interpreted as elements within a system that was being exploited by Franchthi (Jameson *et al.* 1994: 329). The few MN and LN sites are primarily cave sites and three of these were also used during the FN (none are located in the Fournoi Valley). There are just under 40 sites in the southern Argolid with FN material, though in most cases this consisted of a couple of sherds. G9 on the Iliokastro plateau had the greatest concentration of FN sherds (the excavated sites of Franchthi Cave and Halieis may have had more, but there is no indication as to absolute numbers in the survey publication and it would not be realistic to compare sherd numbers between surveyed and excavated sites). Possibly one of the earliest FN sites in the Fournoi Valley is F9, which is located towards the lower end of the valley in the west. F9 and F14 are the only two sites in the valley with clearly FN material (albeit very little), whereas another four sites have material that has been dated to FN-EB I and therefore were probably not occupied before the end of the FN (Pullen 1995: 10). The six sites are scattered across the valley.

The range of known sizes for FN-EB I sites in the Fournoi Valley cannot safely support a case for settlement hierarchy. However, the central location of the largest known site, F32, at 0.35 ha, within the mid-valley site cluster raises the possibility that some form of two-tier system may indeed have existed or at least have been incipient. If one turns to the data collected from the rest of the southern Argolid, there are only two sites with a predominant FN-EB I component and a definite size estimate, both of which are located in the nearby Koilada area. C15 covers 0.4 ha, whereas C25 covers 0.04 ha. The size of C15 fits into the same category as that of F32, and C25 into the same as F20. Although this evidence is limited, it nevertheless corroborates the range of site sizes identified in the Fournoi Valley. Table 7.6 shows the suggested household numbers for a 600-1000sq.m range of surface area covered by each household in FN-EB I. Sites with uncertain site size have been characterised as single household settlements. Based on these assumptions, the un-weighted FN-EB I population of the Fournoi Valley may have ranged between 65 and 85 people (5-7 people per sq.km). This cannot be compared directly with the figures suggested by Jameson *et al.* (1994: 542-547) because they assess FN sites separately and EB I and EB II sites together for the wider area of the southern Argolid. However, it becomes clear from their calculations that they consider an average area of 400sq.m per household in both EB I and EB II and, if we were to use this, then the Fournoi population would total 21 households (or ca. 105 people if the family structure were a nuclear one). A 400sq.m area is considered to be too small here (cf. Chapter 2), but the possibility that we are actually missing some further settlements below post-FN-EBA alluvium cannot be ignored (Jameson *et al.* 1994: 228-246), nor can the possibility that some of the sites with poor spatial resolution were larger than 0.06-0.1 ha and therefore held more than a single household (although at the same time it is unlikely that all sites were contemporary).

Overall, there is a distinct development of the sites and settlements in the Fournoi Valley that was not there before the FN. The presence of the largest known FN-EB I settlement within a loose cluster of sites in the middle of the valley, and in the same location as the subsequent EB II major settlement, suggests that the area was already attracting attention from late FN-early EB I and the grounds were being laid for the development of a large centre in EB II. The most spatially isolated FN-EB I sites, F45 and F49, are located in the upper section of the valley. They are the sites closest to the probable FN-EBA quarry site at F25, as well as to sites in the neighbouring areas of Iliokastro and Ermioni. Despite their distance from the other Fournoi Valley sites, they are still much closer to these than to any other site in the neighbouring areas (the closest FN-EB I site in an easterly direction is G1, 5-6km away at Iliokastro).

The landscape of the Fournoi Valley is particularly attractive in terms of soils, slope and even water sources. Jameson *et al.* (1994: 347-348) may be right that FN and EB I populations moved to this area as a result of later Neolithic agricultural practices which were dependent on now submerged springs. However, this need not necessarily have been the direct result of a FN change from spring-fed to rain-fed agriculture, as they suggest. The apparent preference for areas in the valley that are close to springs suggests that if part of the Franchthi Cave community moved to the Fournoi Valley, this was in order to find similar spring-fed environments, even if they were not as ideal as those in the vicinity of Franchthi Cave; springs in the valley are located along the edges at contact points between the ophiolites and the adjacent limestones, and are likely to have been in similar locations in the past, therefore limiting their contribution to agriculture in the broader valley area. The preference for site location on convex landforms, such as low rises, knolls and ridges may have been a strategy to avoid the potentially catastrophic consequences of sudden floods along the Fournoi drainage system. If this is the case, it also implies that the communities that moved into the valley were already familiar with its negative, as well as more positive, characteristics. In fact the communities of Franchthi Cave and other nearby settlements are the most likely to have already achieved such a familiarity. Despite the lack of significant correlations between site location and geology, FN-EB I sites are surrounded almost entirely by good soils: ophiolites in the Fournoi valley are covered by silty loam, calcareous and clay soils with 'excellent nutrient contents', and limestones are covered with soils of 'rather good nutrient contents' (Gavrielides 1976: 144), providing a productive environment for agriculture. Four sites stand out as being surrounded by rougher terrain (F14, F20, F45 and F49), but all have plenty of gentle slope beyond their wider activity areas. The wider activity areas of F6, F17 and F32 overlap significantly and therefore their total area would not have been able to cover the needs of the households suggested. It has been assumed that 7 ha cover the needs of 1-2 households (cf. Chapter 5), and the three sites together are likely to have consisted of a minimum of 5-7 households. Thiessen polygons for the sites indicate that with a slightly shifted wider activity area, the settlements could have exploited neighbouring, but separate areas (fig. 7.35a).

The evidence from Franchthi Cave and the location of the majority of the Fournoi Valley sites suggest mixed farming as a more plausible strategy of subsistence. Faunal and botanical remains at Franchthi Cave in the Final Neolithic attest the exploitation of goats, sheep, cattle, pig, wheat, barley and lentils (Hansen 1991; Payne 1975). There is no evidence of intensive pastoral activity, unless F45 and F49 have some pastoral function, but even in this case they may simply have been temporary shelters or animal folds, rather than settlements. Modern examples of such sites have been highlighted by ethnographic studies in the Didima basin, where numerous goat and sheep folds have been located along the basin's edges (Chang 2000). Both F45 and F49 had little material, and pottery shapes could not be described beyond 'open' or 'closed' (in the case of F49 only closed shapes were identified, which could suggest storage or transport vessels). The material could be indicative of milking or cheese-making activities within goat or sheep folds, but this remains only a suggestion. In any case, such a function would suggest that animals were sometimes kept away from actual settlements, but the relatively short distance to the Fournoi Focus cannot suggest any short-term mobility, unless it was very short-range and therefore occurred every day. If these FN-EB I sites were to have a more pastoral function, this would imply that the upper part of the valley was void of settlement, as in EB II.

Despite fairly strong continuity in site location between FN-EB I and EB II, F45 and F49 are abandoned by the end of FN-EB I, as are sites F9 and F14 (essentially all sites outside the mid-valley cluster). Except for F1 and F5, whose site extent is unknown (but small), the remaining sites all increase in size. Furthermore, the total number of sites increases by ca. 25%. The most discretely located sites are now three new locations, F4 and F7 on the modern coast to the west and F23 on the northern edge further east. Sites F4 and F7 could constitute part of a more coastally-oriented network that includes sites from the Koilada area, such as C11 and C12 (Franchthi Cave, however, is no longer occupied). The westernmost and upper part of the valley does not appear to be occupied by any settlement during this phase (although a quarry and lithics production site at F25 may have been in use).

Assuming that F6, F15, F17 and F32 formed a coherent community as suggested above, it is possible to discern a two-level size hierarchy: the valley has one major settlement covering 4.5 ha, and another 11 settlements with sizes smaller than 0.5 ha. In the rest of the southern Argolid there are only two sites with a predominant EB II component and a definite size estimate, both of which are located on the east coast. A6 covers an area of 0.9 ha, whereas E4 covers 0.28 ha. Although A6 is larger than the 0.5 ha threshold of the Fournoi Valley, both sites are far smaller than the extent of the total Fournoi Focus. Jameson *et al.* (1994: 544) present a number of sites with extents greater than 1 ha, but in all cases they are sites with multiple components, of which EB II is only minor. A major problem that occurs in their attempt to estimate prehistoric populations is the fact that they use one site size for all phases of occupation (for example E13 (EH-LH) covers a total of 1.8 ha and has therefore been ascribed a population estimate of 225 people for EH I-II, EH III, MH and LH). Table 7.7 shows the suggested household numbers for a 600-1000sq.m range of surface area covered by each household in EB II; the un-weighted population of the Fournoi Valley may have ranged between 340 and 555 people (30-45 people per sq.km). Even considering the probability that not all sites would have been contemporary, such a population density may seem excessive at first; however, it is worth noting that two thirds of the estimated figures reflect the Fournoi Focus households. It seems that we are dealing with a focused concentration of households within an otherwise quite thinly populated landscape, particularly if the southern Argolid is considered as a whole.

If we use the 400sq.m area suggested by Jameson *et al.* (1994: 542-547), the EB II Fournoi population would total 825 people (70 people per sq.km). Turning to F32 specifically, it has been suggested that fragments of ca. 20 different hearths were recovered from this site and that they reflect the presence of ca. 20 households (Jameson *et al.* 1994: 546; Runnels & Munn 1994: 513). If F32 covers an area of 2 ha, each of the 20 households would, on average, cover ca. 1000sq.m, which is the upper range suggested here (the 2.2 ha size suggested in the survey publication would imply 1100sq.m per household; if each household covered on average 400sq.m, a total of 50-55 hearths would be required to represent all households present). Although it is very unlikely that all settlement hearths have been recovered and there may have been other domestic structures without a hearth, the evidence is more in line with the 600-1000sq.m range (furthermore, hearths are bound to have been replaced during a structure's lifetime). As in the case of FN-EB I, issues that need to be considered are the possible obscurity of sites below alluvium and the potentially larger extent of some of the sites without an estimate, and the unlikely contemporaneity of all sites during the phase; the first two would mean more households than suggested, and the last would mean fewer households at any one time. Figure 7.36 shows potential population growth for FN-EB I and EB II at an annual growth rate of 0.1% and 0.2%. The starting figure was set at 20% of the average un-weighted population numbers, though this appears to be too low for a relatively smooth and undisturbed population growth up to the end of EB II. If the starting figure is increased to 40% (30 people), the 0.2 % growth rate is far too high for FN-EB I and yet too low for EB II (fig. 7.37). This suggests that EB II sees a dramatic demographic increase which is either the result of population growth rates greater than the accepted prehistoric levels or the result of a substantial influx of people. This may partly relate to the final abandonment of Franchthi Cave (a possible EB I date has been noted by Runnels & Munn 1994: 468).

In EB II there is no longer a clear preference for site locations on convex landforms to the extent observed in FN-EB I, but despite the lack of significance, there is a noticeable concentration of settlement on relatively flat terrain. Wider activity areas are predominantly on ophiolites. Sites F5, F20, F23, and F29 stand out for the limited amount of gentle slope in their wider activity areas, though once again there is considerable gentle slope beyond them. The clustering of sites in the middle of the valley has resulted in the overlap of several wider activity areas. Figure 7.35b shows the Thiessen polygons created from the EB II sites when the Fournoi Focus and F18/F19 are considered as single sites. In this case it is possible to shift the wider activity areas to a point where they no longer overlap. Thiessen polygons are problematic in that they do not take site size into account, but they have nevertheless provided some insight into the smaller sites in particular. However, it is clear that the Fournoi Focus cannot be sustained by the pre-defined wider activity area; the settlement covers more than half the area, and if we consider the possible number of households present (45-75), the area required for the settlement to sustain itself should range between ca. 155 and 165 ha (assuming that a household requires ca. 3-4 ha of land for intensive cultivation). There is enough land with gentle slope and good geology within the valley to sustain the settlements of EB II, but unlike FN-EB I it seems that the immediate vicinity of the settlements could not have covered subsistence needs (there is no suitable land directly north or south of the settlements) and farmers would therefore have had to travel greater distances to their fields. This would not have been a problem in the Fournoi Valley, since the landscape is easy to traverse and the location of most of the settlements half way along the valley means that most agricultural areas would have been only short distances away (within 4-5km, i.e. up to an hour's walk). What this does suggest, however, is the likelihood that settlements would now have had to negotiate land rights to a greater extent. Another important repercussion of this would be the exploitation of even more areas that are not close to springs, therefore completing the possible shift between spring-fed and rain-fed agriculture. The continuing significance of springs in EB II could be the result of settlement continuity in areas already occupied in FN-EB I, or their management for settlement use, or both.

Small-scale mixed farming is a possible strategy for the valley. Ethnographic studies of the 1970s revealed an overwhelming focus of agriculture on olive production, combined with cereals and fruit and the rearing of sheep and goats (Gavrielides 1976: 143). The cultivation of several small dispersed plots by most households is similar to the practices observed by Forbes (1976; 1982) on Methana (cf. Chapter 6). The other major activity of the Fournoi communities during this time was seafaring. However, the valley's deep soils, over abundant and relatively uninterrupted flat land, provide the necessary conditions for the use of the plough. Furthermore, the total amount of land available within the valley by far exceeds that required to sustain the maximum (un-weighted) number of people suggested for EB II under a strict horticultural regime. In fact there is enough land to follow a more extensive plough regime that could produce substantially more than the 'normal' surplus, therefore allowing communities to exchange agricultural goods, should they wish to. Of course, even if land availability was not an issue, one still has to consider the limitations of a small labour force at household level and the cost of keeping plough animals (Foxhall 2003; Halstead 1995b; cf. Chapter 2). Nuclear family households, if such a demographic structure is indeed appropriate, could not have produced substantial surplus beyond the normal over-production without the use of an external labour force (Foxhall 2003: 83), and therefore the use of the plough would probably have required a more integrated agricultural system where labour and possibly animals were shared (or hired) and land divisions were perhaps not equal.

Irrespective of the precise agricultural practices involved, the above observations suggest a major change in the settlement-subsistence relationship of EB II. Settlement patterns in which communities are no longer able to procure their entire subsistence requirements from their direct settlement vicinity, in a landscape where this is easily achievable, suggests that other non-subsistence-oriented decisions are now also affecting settlement development. Even if all the settlements in the valley were not occupied simultaneously, the presence of a more obvious site hierarchy cannot be ignored. This new pattern of small-scale nucleation could be the result of continuous or repeated selection of the same locations, or of a more integrated community in which members are more directly involved with each other in everyday life, and in which population growth does not drive people to search for new viable settlement locations but instead remain in their original settlements. Access to outside markets and trade have been suggested as a factor leading to the increase in settlement numbers and density (Runnels & van Andel 1987), and the high proportions of Melian obsidian (98.7%) at F32 in particular have been considered to be an indication of the settlement's participation in a wider Aegean trade network (Kardulias & Runnels 1995: 104-105). The presence of andesite on several sites, including F32, and pottery with influences from the Saronic Gulf (Pullen 1995) further suggest at least some level of integration within the wider Aegean. The abundance of obsidian at F32 leads to questions as to how it was acquired, worked and distributed. The majority of cores from the southern Argolid are located in the Fournoi Valley (55 in total), whereas outside the valley another five coastal sites have one core each, and only one inland site has a total of two cores (Jameson *et al.* 1994: 356-358). This suggests a substantial obsidian tool industry at Fournoi, unlike any other in the southern Argolid. If local people were bringing in and/or knapping obsidian, unless there was specialisation at household level (Perlès 1992: 150), this suggests some sort of labour division and craft-specialisation within the community of the Fournoi Focus. Alternatively, the raw materials could have being brought in by non-local people or even by 'travelling knappers' (Perlès 1992: 149 for the Neolithic). In either case one should consider the implications this has for modes of exchange and the relationship between local and external communities. Furthermore, these processes suggest the probable need for a surplus that exceeds community requirements to facilitate such levels of production and exchange. What is also highlighted is the potential distribution of tools from the Fournoi Valley to the rest of the southern Argolid (there is a much higher proportion of blades compared to cores in areas outside the Fournoi Valley; Jameson *et al.* 1994: 359). The size of the settlement, the range of the materials present and the settlement location in the most agriculturally productive area of the peninsula suggest that the Fournoi Focus may have played a fairly important role in the southern Argolid. Furthermore, it may, in fact, constitute an example of socio-economic development moving beyond the subsistence level observed in primarily rural landscapes.

It has been maintained that the catastrophic erosion indicated by the Pikrodafni alluvium was the result of FN-EBA settlement in the more hilly areas inland without taking the necessary soil preservation measures and this may inadvertently have led to the reduction of EB III settlement (Pope & van Andel 1984: 301-302). The presence of only two EB III settlements (and one site with very little EB III pottery) is consistent with the general pattern suggested by the evidence for the wider southern Aegean. It is unfortunate that a definite site size could not be established for either site and it is therefore impossible to make any confident demographic estimation. What does seem clear is that the evidence of site sizes overall does not support the movement of all existing Fournoi Valley communities to F5 and F6. It is worth noting, however, that both sites are located half way up the valley and have been a focus of settlement or other activity since at least the late FN. Both are on rises in the landscape and are surrounded by ophiolites, on gentle slopes and within ca. 0.5km of a fresh water source. Both sites are located in the heart of the Fournoi Valley, with full access to the best soils. The low settlement density of EB III continues in the MBA, though an increase in settlement occurs in the LBA. The most important peaks in settlement in the Fournoi Valley date to the Classical and Early Hellenistic period and later on to the Medieval period. The location of the Fournoi Focus and its vicinity has attracted most settlement activity in the valley from the EBA to the present.

The survey data has shown that EB II saw one of the peak settlement phases in the Fournoi Valley, and probably one of the greatest EB II concentrations across the southern Argolid as a whole. Although the wider activity areas used in the analysis served to highlight the characteristics of the valley in relation to FN-EBA site location, in many ways it seems most likely that the valley in fact formed one larger activity area, at least for the communities of EB II.

CHAPTER 8

Southern Aegean landscapes in the Final Neolithic and Early Bronze Age

8.1 'Side-by-side survey': A comparative approach to archaeological survey data

This research has investigated changing regional demography and settlement patterns in the southern Aegean during the FN-EBA by drawing in detail on three survey datasets: from Kythera, Methana and Fournoi in the southern Argolid, and exploring them within a GIS-led analytical environment. The three survey areas were chosen on the basis of their potential for a comparative approach from a methodological and also a regional perspective. The analyses and results in the preceding chapters have shown that detailed assessment of survey methodologies and appropriate calibration of survey datasets make comparative investigations possible.

The problems associated with comparing surveys that were originally conducted using different methodologies were discussed in detail in Chapter 3, where it was made clear that any such approach requires careful examination of survey research designs, sampling strategies and levels of recording and permanent collection for each survey (a process that Alcock 1993: 49-53 has described as 'archaeological resource criticism'). There are a good number of surveys that can be explored in similar ways and be compared with the ones discussed in the previous chapters, for example Nemea and Lakonia on the Mainland. However, it would not be possible to include all Aegean surveys in the same way, because of the low resolution of available data of many survey datasets, particularly those that took place during the earlier pioneering stages of intensive survey. A useful approach would be to include the results derived from low-resolution datasets on a much broader level with the quantified investigations of high-resolution datasets, to assess the extent to which the former might follow similar patterns. Such a framework would allow archaeologists to make the most of the available data without falling into the trap of comparing different qualitative categories as though they were the same.

The methodological process used to compare Kythera, Methana and Fournoi has involved four stages:

- A detailed investigation of each survey in terms of research design, methodological framework, interdisciplinary studies, such as geoarchaeology and ethnography, and quality of resulting data, with regard to the limitations they pose in answering questions of settlement pattern change and development (Chapter 3). Understanding the limitations of the data has been the crucial key in attempting methodological calibration (cf. infra).
- The use of a core dataset (in this case from the Kythera Island Project) for a pilot study on assemblage integrity, site definition and settlement patterns, which can then be used as a framework with which to investigate other datasets (Chapters 4 & 5).
- The separate investigation of each dataset, and the assessment of ways to extract the maximum and best quality information possible, in such a way that comparisons can later be made with the other datasets. This has been particularly important in terms of establishing the reliability of settlement distributions and also phase-specific site size. Furthermore, interpretation of the results was also carried out separately in order to establish a reliable and independent picture for each area before attempting any comparison (Chapters 4-7).
- The comparison of the three areas as different landscapes within the wider framework of the southern Aegean (as discussed in Chapter 2; this also forms part of this chapter, sections 8.2 and 8.3).

Data calibration took place at several levels, considering the impact of local geomorphology, material preservation and survey resolution on the recovery and integrity of artefact assemblages in the landscape:

- The assessment of the distance between walkers in a team and its impact on the recovery of sites suggested that slightly different resolutions have not produced serious discrepancies between the three surveys. However, the results emphasise that for the incorporation of further surveys it is necessary to examine the nature of the smaller scatters identified in each case (i.e. their size, chronology and any associated visible structures) and how they are affected by different walker spacing.
- The assessment of geomorphology has suggested that site integrity in the three areas has been affected more by the deposition of soils over them than their actual depletion as a result of soil loss. Overall, it seems that the majority of sites are

likely to have been recovered, with the exception of specific areas within each survey which appear closer to the characteristics discussed by the Boeotia Project that could result in a hidden prehistoric landscape: the Throni basin on Methana, the highly alluviated sections of the streambed areas at Fournoi and on Kythera, the coastline of the ancient harbour at Palaiopolis, the gorge/valley bottom between Palaiokastro and the Mitata and Viaradika plateaux and parts of the Livadi basin. The remaining areas seem to contain fairly well preserved prehistoric landscapes. One of the generalisations provided by the hidden landscape theory, i.e. that prehistoric pottery is only recovered in large scatters or as minor components within multi-period sites, does not hold for any of the three survey areas. The combined exploration of FN-EBA sites and tract data from the Kythera Island Project has highlighted the need for micro-level investigation of each site for the better understanding of localised geomorphological processes affecting the assemblages.

- The most poorly preserved material of all areas and all FN-EBA phases is the chert fabric that defines FN-EB I sites on Kythera, and it is possible that some FN-EB I scatters may have been missed. In this case, however, it seems unlikely that the detection of further small rural settlements would make a substantial difference to the patterns established with the available dataset (except that a larger number of sites may have produced more significant results in the statistical analyses).
- The different site recording and collection methods may have produced some discrepancies with regard to the identification of FN-EBA components, and the difference is more acute between the Kythera survey and the other two because the former provided a fuller spatial coverage, as well as complete collection samples (not just feature sherds). This will have had implications with regard to the number of sites located on Methana and Fournoi and also the range of shapes identified, which would have been used for the assignment of site function. The exploration of FN-EBA sites at Fournoi in 2003 suggested that any inconsistencies with the original survey were likely to be the result of processes taking place in the 20-year interim rather than of methodology.
- The variation in site recording and collection methods are unlikely to have influenced the identification of site extents because in all three surveys there has been a fairly clear distinction between on-site and off-sites areas. However, this does not remain the case when trying to extract phase-specific site size. The gridding of sites on Kythera meant that spatial resolution of the material could be used to explore the size of sites for each FN-EBA phase, but the lack of such spatial referencing for Methana and the southern Argolid did not allow equivalent estimates. In the case of Fournoi in the southern Argolid, the exploration of FN-EBA sites in the summer of 2003 as part of this research resulted in further clarification. Although gridding was not

possible in the time available and material was explored *in situ*, it was still possible to determine FN-EB I and EB II site extents with considerable certainty. Sites on Methana were not visited individually as part of this research, but investigation of the published data allowed for some clarification of FN-EBA site sizes. Single-phase sites, or sites where one or more FN-EBA phases constituted the main component, were prioritised at a first stage, and then the full site extent of the remaining, multi-period sites was taken as the maximum possible size, rather than the absolute size. Since four of the five large sites were both FN-EB I and EB II, it was necessary to consider two different narratives depending on two different forms of site development during these phases. The re-visitation of sites that are known to have material dating to the periods of interest is a valuable method of obtaining reliable phase-specific size data from surveys where these have not been recorded. However, when this is not possible, the isolation of single-period or major component sites as a first step, followed by a more critical inclusion of multi-period sites, can provide information that can then be used to compare with that from other surveys.

- What could not be used for direct comparison were the non-site data. The lack of readily available tract data from the southern Argolid and Methana meant that the only non-site FN-EBA data in the two areas were collected from multi-period sites. The information on the FN-EBA landscape provided by the Kythera survey tract material only serves to highlight the importance of recording and collection at all stages of surface survey.

The calibration of these datasets enabled their study within a standardised analytical framework. The use of GIS produced the environment in which to integrate and explore formally a number of related spatially referenced databases, and allowed for their quantitative, as well as qualitative assessment. The statistical evaluation of patterns offers a partial safeguard against making assumptions from biased or incomplete archaeological records. Furthermore, the individual assessment of the results for a region-specific interpretation has set the stage for the comparison of reliable and independent regional data. The next sections present the key features of the three areas and an assessment of how these fit into the wider picture of the FN-EBA southern Aegean.

8.2 Comparing three FN-EBA landscapes: Kythera, Methana and Fournoi

8.2.1 The environmental setting

There are some significant differences between the topography, climate, and natural resources of the three areas investigated:

- The study area on Kythera consists of a larger and more diverse landscape in terms of micro-environments, the most prominent of which are the Mitata plateau, the internal Livadi and Pourko basins and the coastal plain and low hills of Palaiopolis, all consisting mostly of gentle slopes with soils produced from marls or harder limestone. The remaining area is made up of an impressive set of dissecting gorges and smaller pockets of land of varying quality. An abundance of springs can be found, mainly in the vicinity of the gorges, and annual precipitation levels are greater than at Fournoi or on Methana.
- The mountainous and fairly rocky landscape of Methana has created a patchwork of similar but small and scattered, mainly coastal, micro-environments, consisting of gentle slopes with productive volcanic soils, which are interrupted by the very steep and thinly covered slopes dominating the internal section of the peninsula and hampering movement across it. The scarcity of fresh water sources and the low annual precipitation levels make this area the most climatically marginal of the three.
- Finally, the Fournoi Valley is the only (but also the smallest) area that consists of an overall homogenous landscape of gentle slope and deep fertile ophiolite soils, interrupted only by a couple of low hills jutting out towards the western end of the valley. The presence of several springs along the valley provides an additional advantage, however, annual precipitation can vary considerably, though probably not as much as on Methana. In a way, the Fournoi Valley constitutes a micro-region of the wider southern Argolid region.

At a first glance these landscapes are very different, but it soon emerges that what unites them is the presence of land suitable for human subsistence – albeit in different amounts and layout. However, it is this differentiation in size and distribution that will ultimately have played an important role in the strategies adopted by local communities and their long-term survival.

8.2.2 Settlement patterns and demography

Settlement patterns have also seen some variation between the three areas:

- The first definite settlements within the surveyed area of Kythera appear sometime in the FN (it is not clear how early in the phase). Where available spatial resolution permitted the estimation of site size, they are predominantly sub-0.1 ha, with the exception of Kastri, which covers ca. 1.7 ha by the end of EB I. The landscape is filled in during EB II and several settlements also increase in size, particularly Kastri, which more than doubles in extent and possibly increases in settlement density. The EB III phase is characterised by a decrease in the number and size of settlements, which may have been exaggerated by the different lengths of EB II and EB III and the likelihood that some of the EB II settlements have probably continued in use during EB III or perhaps date solely to EB III, reflecting the continuation of mainland traditions along with the newly introduced Cretan ones. Unlike Methana and Fournoi, there is clearly no large-scale abandonment; in fact Kastri seems to increase in size. In all three phases Kastri is the largest settlement by far, constituting the only site in the upper level of a two-tier size hierarchy in FN-EB I and a three-tier size hierarchy (or at least scalar differentiation) in EB II and EB III. In EB II, each of the three main areas (Mitata, Palaiopolis and Livadi/Pourko) has at least one large settlement surrounded by a cluster of smaller ones. The un-weighted demographic estimates for the tractwalked area suggest 210-275 for FN-EB I, 690-1065 for EB II and 495-740 for EB III, within the tractwalked area (this assumes an area of 600-1000sq.m for a nuclear family household of 5 people). It is very likely that the population numbers for EB II and EB III are much lower and considerably higher respectively, because of the EB II+ material dating also to EB III. Excluding Kastri from the calculation, un-weighted island demographic estimates are 800-850 for FN-EB I, 2800-4500 for EB II (assuming EB II+ settlements dating to EB II only) and 1650-2200 for EB III/FMin (100-120 for FN-EB I and 1100-1800 for EB II/EB II+ when weighted by the shortest FN-EBA phase). On a localised level, there may have been some level of population movement within the survey area towards the end of EB II and early in EB III, in terms of local communities moving inland as a result of the introduction of Cretan communities. However, this cannot be confirmed, and if the Cretan communities moved in gradually and peacefully, they may in fact have become integrated into the already populated Palaiopolis area. Furthermore, FMin assemblages may simply reflect where these communities moved to, indicating limited movement into the interior, something that may also be indicated by the presence of a possible FMin burial on site 004 on the Mitata plateau and on site 164 in the Pourko basin.

- Methana sees what appears to be a burst of primarily sub-0.5 ha settlements in the late FN or early EB I, followed in EB II either by abandonment (if the few 1-1.5 ha sites date to EB I) or nucleation (if most large settlements date to EB II). In EB III the peninsula seems to be almost completely deserted, with only one settlement of probably limited extent remaining on the west coast. Depending on the date of the large site extents, there are two plausible settlement size hierarchy patterns: either a two-tier system in FN-EB I that falls apart with the abandonment of many settlements in EB II, or the beginning of a two-tier system in FN-EB I marked by the presence of one large site (105) that develops into a more nucleated settlement pattern in EB II, characterised by a looser two-tier settlement network. The un-weighted demographic estimates for the two patterns are: a) 490-780 for FN-EB I and 115-170 for EB II or b) 295-450 for FN-EB I and 310-500 for EB II. If the length of the periods is taken into consideration in the first narrative, the populations are likely to have been slightly less, though this does not negate the dramatic decrease in population numbers between FN-EB I and EB II. However, in the second narrative, the weighting by period duration is likely to produce a more realistic increase of population numbers, since the one observed here seems quite low. Overall, the patterns observed on Methana are not reflected in neighbouring areas, such as the rest of the southern Argolid or Nemea (Roberts 1988), where there is a more distinct increase in settlement numbers between the two phases (though perhaps not Berbati-Limnes where EH I and EH II assemblages appear to be comparable, albeit very small (Forsén 1988)). What this may partially reflect is a combination of the peninsula's rocky and idiosyncratic landscape compared to other areas and its inhabitants' more unusual and varying socio-economic strategies across different periods.
- Fournoi sees an introduction of small sub-0.3 ha settlements, probably late in the FN, which increase in number during EB I. EB II sees an even greater settlement increase that is also accompanied by the development of a major 4-5 ha centre half way up the valley, the largest settlement throughout the southern Argolid. As in the case of Methana, EB III is marked by a dramatic reduction in the number of sites, and this phase is represented by only two small settlements, suggesting abandonment of the area rather than nucleation. There is little evidence of settlement hierarchy based on site size in FN-EB I, but this changes radically in EB II, with a distinct gap between the Fournoi Focus and the remaining sub-0.5 ha sites. The un-weighted demographic estimates are 65-85 for FN-EB I and 340-555 for EB II.

8.2.3 Subsistence strategies

The likely subsistence strategies based on the analysis of settlement location and environmental features and resources are summarised as follows:

- Small-scale mixed farming appears to be the most suitable agricultural practice for the surveyed area of Kythera. Use of the plough would have had to be limited, as there are few areas with deep enough soils, and in fact the wider area of Palaiopolis would not have been sufficient to sustain the local populations through extensive farming, particularly in EB III, but also possibly in EB II. There are no clear signs of exclusively pastoral use of sites within the survey area, which allows easy access to most locations. In most cases, the immediate vicinity of settlements in all phases provides sufficient 'good soils' and gentle enough slope for cultivation, with the exception of EB II and EB III Kastri. The surrounding land could not possibly cover the needs of the likely population of the settlement during these periods, and if the settlement was primarily agricultural, farmers would have had to move further afield, beyond the satellite settlements to the north and northeast. However, the settlement is unique on the island in terms of its external contacts, and it is possible that there would have been some differentiation in labour; this suggests that although the settlement was benefiting from its location in Palaiopolis, the harbour was actually its main priority and not proximity to land, and the relationships between its population and agricultural subsistence strategies may have been more complex.
- The landscape of Methana would have been even less suited to the plough than Kythera, with the most likely candidate areas for its use being Palaiokastro and Loutra. Overall, the dispersal of sites across the landscape, even in the case of the fewer and larger settlements of EB II, would have benefited more from small-scale mixed farming. The higher-altitude sites in the central mountainous areas may have involved mixed farming or perhaps, to some extent, they may have served as shelters for shepherds exploiting various perennial springs for their livestock. The available agricultural land makes it unlikely that many settlements would have been able to overproduce beyond a 'normal surplus' to an extent that they could comfortably exchange it without risking starvation if a poor year followed. The scarcity of water and the danger of drought are likely to have made it difficult for communities to part with their annual produce (it is noteworthy that the Methanites in 1970s were unwilling to give away their surplus, despite the fact that they were also exploiting terraces and were using the plough to increase production; Forbes & Foxhall 1995). This may also explain why this area appears to suffer from slow growth into or substantial abandonment during EB II.

- Fournoi is markedly different. Although again the potential for small-scale mixed farming is there, the area is also the best candidate for the use of the plough because of its deep productive soils. The amount of land in the valley would also have been capable of providing produce beyond community needs, and this along with the use of the plough could have led to extensive farming, increased yields and the creation of surplus that could have been used at various levels of interaction (local, southern Argolid, or maritime links). It is, of course, possible that some settlements have been obscured by subsequent alluviation, but unless they were of considerable size (in which case they may have been more visible after later land use), this is unlikely to have a serious impact on the population/land ratio.

8.2.4 External links

All three areas have demonstrated some level of integration within the wider Aegean:

- Kythera's island character and location could suggest a stronger maritime outlook, though the primarily rural nature of its communities suggests that this was probably fairly limited outside Kastri. The strong relationship between FN-EBA sites and the presence of obsidian (found on two thirds of the 72 sites with definite FN-EBA components, 19 of which had more than ten pieces) does suggest that besides the obvious Cretan connection reflected in the ceramic assemblages, the settlements within the survey area may have interacted with the other Aegean communities to some – albeit limited – extent. However, the greatest number of obsidian pieces was recovered from Kastri (though counts only reached a total of ca. 120 pieces; 5% of the amount recovered from site F32 at Fournoi). This is still interesting, particularly when considered in conjunction with the presence of Kastri in relation to the harbour and with the fact that most cortical material is located in this area (along with the area of Diakofti further north; Broodbank & Kiriatzi n.d.a), once again suggesting at least some level of integration with the wider southern Aegean.
- External (Saronic and Cycladic) contacts on Methana are indicated by the obsidian, pottery and andesite (if the latter is not local). Highest counts of obsidian were attested at sites 063/064 (ca. 220 pieces) and 008/009 (ca. 200 pieces), although, interestingly, neither produced any cortical material. There is a relatively small number of cores or pieces with cortical material, and these are distributed mainly on sites along the northeast and east coasts, except for the inland lithics site (003) and site 054 above Vathy harbour (no more than two cores were found on any one site). There is therefore no indication that particular sites were dominating the procurement of obsidian raw

materials or the production of obsidian tools, unlike Kythera and Fournoi, suggesting that external links may have operated at more localised levels (individual settlements) than regional. This could be the result of the location of Methana in the Saronic Gulf, or, more likely, once again it may reflect a loosely integrated settlement network across the peninsula brought on by topographic fragmentation. It is also noteworthy that there is no evidence to suggest that andesite was being exported from the peninsula (Runnels 1985; 1988 links EBA millstones from the southern Argolid and elsewhere to Aegina, not Methana).

- Fournoi is particularly interesting in EB II in terms of the quantities of obsidian and the presence of the majority of cores in the area (most of the cores were found at the Fournoi Focus). More than half of the Fournoi Valley sites with FN-EBA definite components revealed obsidian. The highest concentrations were identified in the mid-valley settlements, 100+ pieces on site F19, and ca. 2500 pieces at the Fournoi Focus, most from F32. Another five sites revealed more than ten pieces. Even if members of the local communities were not travelling to Melos themselves, there seem to be strong links with seafaring communities that are procuring raw material. More to the point, Fournoi may have been, if not the exclusive, then certainly the main point of introduction of obsidian to the wider region of the southern Argolid.

8.3 Regional trajectories and wider implications: Placing Kythera, Methana and Fournoi within the context of a southern Aegean framework

8.3.1 Social developments in FN-EBA communities

The broader observations for the FN-EBA on a southern Aegean scale were discussed in Chapter 2. One of the most striking processes beginning in the FN and reaching its peak sometime in late EB II is the increase in the size and number of sites, their dispersal across the landscape and the infilling of areas generally regarded as climatically and/or environmentally marginal, phenomena that have been primarily attributed to population growth and a shift in subsistence strategies across the region. The middle to late EB II on the southern Mainland is characterised by several substantial settlements with 'corridor houses', perhaps the most prominent being the House of the Tiles at Lerna, which has led to the suggestion of complex centralised socio-economic systems that fit in with the wider patterns of increased communication in the southern Aegean. The reduction of site sizes and numbers again in EB III heralds the end of this particular burst of settlement development before a new pattern of expansion begins, now mainly on Crete, in the early MBA.

All three areas under investigation seem to reveal signs of the FN-EB I dispersal process observed in other areas also. Furthermore, they are all characterised by a lack of definite settlement prior to the FN, though with the exception of the Fournoi Valley, they are not completely devoid of earlier Neolithic material. This is particularly significant when one observes the settlement patterns and the priorities of these first communities in each area. There appears to have been some variation in the familiarity with the landscape by the populations entering them. The investigation of the environmental variables indicated a stronger familiarity for Fournoi and Methana, where communities seem to have picked up on specific niches, the springs in Fournoi and the flatter and more fertile areas on Methana. The lack of significant patterns for Kythera suggests that communities were experimenting more with the landscape at this stage. The concentration of most settlement in the vicinity of springs at Fournoi may support the argument by Jameson (1994) that the communities were moving up the valley from Franchthi Cave because of the loss of springs in that area to the rising sea. However, what is interesting is the familiarisation with the spatially marginal peninsula of Methana. There seems to be more evidence for pre-FN use of the landscape on Kythera than Methana. Although the nature of the limited LN material beyond the KIP borders on Kythera is poorly understood, it is plausible that the island would have had pre-FN settlement, either from Crete or the Mainland. In contrast, what we may be seeing are the results of a far more integrated landscape in the Argolid, where access to hunting grounds on Methana was easier, and possibly as a result of a reaction to a more extreme landscape where appropriate settlement locations were more obvious. The pre-FN evidence on Kythera may reflect use of the island as a stepping-stone between Crete and the Mainland, combined with a more sporadic exploitation of specific hunting grounds that did not necessarily facilitate detailed knowledge of the island's more diverse landscape. If this were the case, it is possible that the insular character of Kythera makes it more spatially marginal than Methana in the first instance.

The various reasons suggested for settlement dispersal across the southern Aegean in the FN-EBA cannot be assessed definitively by this analysis. Demographic growth and the resultant need for more land seems quite possible, although this need not always be the cause for such phenomena (for example, Foxhall 2003: 77 doubts that this was the cause of population movement in Archaic-Classical times). In the case of the later Neolithic and EB I in the areas under investigation, it also seems unlikely that demographic growth reached the kind of thresholds that would lead to communities moving into more arid areas to sustain themselves, unless they had been employing rather non-intensive agricultural practices requiring more area. A more careful assessment of this would require more detailed knowledge about the origins of these communities and the specific areas they inhabited prior to moving. It is possible that there was a change in agricultural practices that led to dispersal (although in Fournoi, for example, the preference for springs suggests that such shifts might not have been universal).

It is not possible to ascertain when exactly communities first settled, other than the likelihood that it was sometime in the late FN for Methana and Fournoi. Kythera may have been earlier. Nor is it clear whether there was a sudden influx of people or whether it happened gradually. Even if a number of families arrived together, it is possible that others continued to come in throughout the FN and EB I. In terms of the total number of FN-EB I settlements, Methana has the highest number per tractwalked area (3 sites per sq.km compared to 0.6 on Kythera and 0.8 at Fournoi). It seems unlikely that much of the remaining peninsula would have been settled because of the pre-dominance of steep slopes (with the exception of the Loutra area on the east coast). If the whole peninsula is considered, the total number of sites per sq.km would drop to similar levels to those attested at Kythera and Fournoi. The largest site for this period is Kastri on Kythera with an area of ca. 1.7 ha, although it is possible that it was not very densely occupied. There is no large settlement at Fournoi, although the close proximity of sites F6, F17 and F32 may have reflected or resulted in similar ties as the households at Kastri. The location on Methana of two large settlements with a definite FN-EB I component in what appears to be the area of least agricultural potential surrounding any settlement suggests that either the large extent of site 108 dated to EB II, or that there are more complicated, non-subsistence-oriented reasons for site location in this area. Whatever the case, it seems unlikely that the direct area surrounding either site would have been able to sustain populations of such large sites. Overall, it seems more logical to assume that with the exception of the FN-EB I single-phase settlement at 105 all other large sites were probably of EB II date. The variations in site size in all three areas could either suggest the beginning of some sort of settlement hierarchy, or they may simply be a reflection of the way in which communities moved and settled into the area.

In EB II, although Kythera and Fournoi seem to consolidate the already emergent settlement patterns of EB I, Methana was either partly abandoned or, more likely, saw small-scale nucleation in combination with some small level of abandonment. The increase in settlement numbers and size at Fournoi and Kythera suggests a substantial increase in population numbers that may have been the result of population growth in combination with communities still moving into the areas. In terms of the total number of settlements throughout EB II, Methana now has similar numbers per tractwalked areas to the other two regions (all range between 1 and 1.4 sites per sq.km), although inclusion of the non-tractwalked area would lead to a significant drop for Methana to ca. 0.25 sites per sq.km. If these are compared to the un-weighted population estimates based on site size, Methana (including the whole peninsula) has the smallest population density of ca. 6-10 people per sq.km, Kythera (tractwalked area) follows with ca. 15-25 people per sq.km and Fournoi has the highest population density of ca. 30-50 people per sq.km. The figures of the Fournoi Valley highlight the area's ability to attract higher population numbers compared to its neighbouring areas as a result of its agriculturally favourable land. Similarly, if we consider the population figures of Palaiopolis separately from the rest of the tractwalked area, the population density for this micro-region would be ca. 55-85 people per sq.km, whereas the remaining tractwalked area would have had a population density of 9-14 people per sq.km. The above observations emphasise the need to look at population numbers and density figures in the wider context of settlement patterns.

One of the key features of this phase is the development of Kastri on Kythera and Fournoi Focus in the Fournoi Valley into settlements that cover an area of ca. 4.5 ha each. They are both located in areas of good agricultural potential, although in neither case can this sustain the needs of the probable populations residing in the settlement. The presence of a prehistoric harbour and inlets around Kastri would have reduced available land substantially, not leaving enough between Kastri and the surrounding settlements to cover its needs. This suggests that the community of Kastri would either have had to travel beyond the Palaiopolis settlements for more agricultural land and therefore would have had to negotiate land ownership with these settlements, or potentially it may have depended partially on the surrounding settlements for subsistence. Either way, it seems that the priority for this settlement is the harbour rather than direct proximity to agricultural areas. At Fournoi there are no settlements close to the Fournoi Focus and site F18/19, which means that any negotiation of land rights would have been between the communities of these two settlements. The only other prioritisation may have been the close proximity of springs which, although they could not have covered any potential irrigation needs, may have been exploited for domestic activities or livestock. Although emergency irrigation may have been possible for the few fields close to the springs (Halstead 1989: 72), their karstic nature suggests that long-term drought would inevitably have affected their flow. Therefore, precipitation is important irrespective of the presence of springs. Even so, the location of the Fournoi

Focus ensures relatively close proximity to most agriculturally favourable areas of the valley.

It would appear that even if both settlements were dependent on outside contacts for part of EB II, their development into such settlements followed different trajectories: Kastri even from FN-EB I is likely to have attracted populations because of the combination of harbour and agricultural merits, as indicated by the continuing presence of external influences in the cultural assemblage (Broodbank 2004). The Fournoi Focus (located ca. 4km away from the coast), however, is more likely to have attracted settlement because of its agricultural merits, including the presence of springs, whereas the external links may have come as a result of a successful agricultural economy that allowed for the development of an elaborate exchange system that moved beyond subsistence. Therefore what we may be seeing are two major settlements where external contacts and integration with the wider Aegean are, in one case, a cause (Kastri) and, in the other, the result (Fournoi Focus) of their development.

Another point to consider is the extent to which size variation across the survey areas implies settlement hierarchy and whether this takes a similar form. Settlement size hierarchy on Kythera is more complex, with one or two large settlements located in each of the main areas (Palaiopolis, Mitata and Livadi/Pourko). This is probably because the survey area covers a more diverse landscape with several quite distinct micro-regions where settlements develop in tandem, whereas the Fournoi Valley is a single micro-region in itself. Methana is the only area of the three investigated that does not contain a large settlement in the 4-5 ha range. This could be the consequence of two possible factors: the landscape of Methana cannot hold larger communities at any one place because of the fragmented nature of agriculturally favourable land (even in the case of Loutra, the surrounding area could not have sustained a settlement greater than 1.5 ha, assuming an area of 600sq.m per nuclear family household of 5 people and each household requiring 3-4 ha of land for intensive cultivation), and also it is possible that the landscape enforced a more egalitarian social network of more loosely connected clusters of settlement. If sites were nucleated in EB II, then the overall observed settlement pattern on the peninsula is different from the other areas, not in the sense of having a few sites larger than 1 ha – because others have them also –, but in the sense of having relatively few smaller dispersed settlements in combination.

Turning to the Fournoi Focus, this settlement probably consists of the widest range of material across the three areas. Besides its rich ceramic and chipped stone assemblages, what really distinguishes it is the concentration of hearths, rooftiles and possibly mudbrick. Rooftiles have been identified at several sites across the Peloponnese and Attica (Hägg & Konsola 1986; Pullen 1986a; Rutter 1993; Wiencke 2000). The presence of rooftiles does not imply the definite existence of a 'corridor' house at Fournoi, but the presence of ca. 20 hearths suggests a fairly dense settlement layout, particularly for site F32 of the Fournoi Focus. Overall, despite the relatively large size of both Kastri and Fournoi within their respective regions, they are still quite small when compared to major EB II settlements in the southern Aegean as a whole.

With regard to site function more generally across the three areas and the different FN-EBA phases, most sites outside Kastri and the Fournoi Focus appear to have had some form of agricultural purpose. In some cases, the range of materials has not been complete enough to ascertain the precise purpose. Although small sites with less coherent size and cultural assemblage have been attributed a single household for the purpose of demographic estimates, it is acknowledged that in some cases these may have been larger settlements with more households, or in some cases just shelters with no permanent residents. These two possibilities may, in fact, balance out without greatly affecting the suggested population estimates. What we are clearly missing are burials. The lack of burial signatures for FN-EB II on Kythera and the FN-EBA as a whole on Methana and in the Fournoi Valley matches their elusiveness on the Peloponnese more generally (in contrast to the more prominent burial patterns in Attica; Cavanagh & Mee 1998: 15-22; Pullen 1985: 88-156; Rutter 1993: 116-117). Unfortunately, part of the problem may be that the cultural assemblages identified in many tombs of the Mainland seem to be similar to the ranges identified on small settlements (Cavanagh & Mee 1998: 19-20 suggest that the average burial may have material such as cups, bowls, frying pans, jars, jugs, pyxides, obsidian blades and metal objects; Pullen 1985: 108-109 for a description of the Zygouries mortuary assemblages), therefore it is possible that some of the smaller sites identified during survey could, in fact, be burial locations. Indications of burials are only attested on Kythera and date to EB III or slightly later and follow a Cretan not a Mainland pattern (EM III-MM IA; cf. infra). When considering the location of sites in relation to areas with good agricultural potential, in the extreme majority of cases sites are found, if not directly in the vicinity of such areas, then certainly very close to them, suggesting an agricultural function.

The relationship between cultural assemblages, settlement patterns and the local environment was explored successfully to highlight potential subsistence strategies, exchange systems and socio-economic development. The three survey areas have indicated many similarities that may, in fact, be characteristic of the wider southern Aegean and, at the same time, variations that suggest more localised processes working on a regional or micro-regional scale. The location of most settlements in proximity to the most agriculturally productive soils does indicate that subsistence may have been a primary objective, thus confirming the farming character of the majority of sites.

The question of how intensive were the FN-EBA cultivation strategies is important, as it greatly affects the risk of insufficient production rates and also the ability to produce above a 'normal' surplus and therefore to develop more intricate and stable exchange systems. The use of the plough for extensive farming in areas with sufficient 'good' land would allow for the production of surplus above that required to sustain the local communities or groups of households. It has been made clear that only the Fournoi Valley really has this type of environment, i.e. abundant, fairly flat, uninterrupted productive soils. Of course, even if the landscape did support the use of the plough, this does not mean that the local populations would necessarily have embraced its use even if they were aware of its potential, and a plough-based regime may have conflicted with cultural patterns concerning subsistence strategies, such as land divisions (on Methana and in the Fournoi Valley during the 1970s plots were constantly being sub-divided as a result of inheritance patterns; Forbes 1976; 1982: 324-355; Gavrielides 1976).

Irrespective of whether communities followed intensive horticultural or more extensive plough-based regimes, there are a number of factors that could have led to the level of settlement hierarchy and therefore possible social hierarchy implied by the settlement patterns. The first issue to consider is the availability of land for communities that move into the areas at later stages of settlement if one assumes that the landscape was filled in gradually throughout the FN-EB I and possibly part of EB II. This particularly concerns Methana and the Fournoi Valley, where there seems to have been deliberate targeting of the best agricultural areas from the outset. Communities arriving at later stages would have had to negotiate with already established settlements about what areas of the landscape they could exploit (Kramer 1979: 152-153 has described an example of an Iranian village where socio-political conditions made it difficult for some people immigrating from other villages to own their own land, giving a definite advantage to already established families). This in itself could bring in a first level of social inequality in the region. At a second stage, inequalities are likely to have been created through some settlements controlling better areas and therefore suffering less at times of drought etc (as discussed in Chapter 2), possibly meaning that if already established settlements controlled such areas, then they would continue to be better off. This may therefore explain why the Fournoi Focus is the most long-lived settlement with the strongest external links and most control over the raw material, such as obsidian, which is introduced to the valley and the southern Argolid as a whole. The development of craft-specialisation in obsidian tools and pottery production (as suggested by Pullen 1995: 42) would also have been a result of this. The homogeneity of the valley, however, may suggest that a year of poor precipitation would have affected it is a whole. Close proximity to springs, even if these were not in the most ideal locations and also suffered from the drought, may still have partly helped in an emergency. On Kythera, the early settlement of Kastri may have led to greater control of the Palaiopolis area in conjunction with its control of the harbour, leading to settlement differentiation throughout the FN-EBA. Settlement networks in the various micro-regions of Kythera may have resulted from similar phenomena (excluding the harbour factor). The negotiation of land rights may have been at two or even three levels: at household level, whether between single household settlements or larger multi-household settlements; at settlement level; and at settlement network level between different areas (e.g. on Kythera). Other levels of land division may have depended on the time of year or farming practices. For example, land with crops may have been under the jurisdiction of specific households, whereas areas left to fallow and/or grazing may have been open to the wider community (Brück & Goodman 1999: 13). The same holds for uncultivated areas with wild resources (Forbes 1996; 1997a). The differences in landscape fragmentation in the three regions would most likely lead to variations in the ways these were negotiated. Such dynamics would have also played a role in social development in all three areas.

Settlement on Methana and in the Fournoi Valley in EB III conforms to the patterns observed throughout the southern Aegean. Whether abandonment begins in late EB II or at the beginning of EB III cannot be discerned from the archaeological data. The settlements that remain occupied in EB III are all in areas with the best agricultural potential, but also the settlements themselves are located on knolls, which would have perhaps protected them from extreme floods, though not necessarily from sudden localised erosion. Rutter's observation that EB III settlements tend to be smaller than their EB II counterparts is also true for both Methana and the Fournoi Valley, thus excluding the possibility of large-scale nucleation of the rural population (Rutter 1993: 123). It seems unlikely that shortage of agricultural land as a result of demographic growth could have brought on such changes directly (Foxhall 2003: 77-78 holds similar reservations for the dearth of settlement in Archaic times, particularly since denser populations in later periods do not seem to suffer accordingly). Suggestions of extreme climatic conditions, such as drought (Weiss *et al.* 1993; affecting the wider Eastern Mediterranean), or poor soil management in agricultural practices, resulting in poor annual production yields or extreme erosional events could be partial causes for the EB III patterns. Areas such as Methana are likely to have suffered more than areas such as the Fournoi Valley, although southern Argolid settlements further up the drainage system may caused erosion that would have affected the settlements of the Fournoi Valley in the lower part of the same system. Nevertheless, the perseverance of Methana and Fournoi Valley settlements that were major in EB II suggests that they were more prone to surviving the events that led to the 'collapse' of the wider settlement networks in EB III. Perhaps areas such as Fournoi, which seem to have become dependent on more integrated exchange systems, faded into the background with the collapse of the wider Aegean trade-networks.

What is striking, however, is the very different pattern observed on EB III Kythera. The number of settlements with FMin pottery remains at similar levels to those of EB II, except that they tend to concentrate in the Palaiopolis plain, and this can be understood in the context of the shift of cultural influence from the Mainland to Crete. In fact, the interaction of Mainland and Cretan cultural assemblages probably under-represents the presence of EB III settlement, since some of the sites with Mainland assemblages may in fact have lived on into EB III (as discussed in Chapters 4 & 5). The large-scale occupation of Kythera in EB III may be the reason we are seeing possible signs of incipient soil protection strategies here. If the patterns on Kythera were conforming to those of the southern Aegean, we would be seeing a significant reduction in settlement (and in this case, most EB II-III settlements with EH assemblages should date to EB II and not EB III). Perhaps EB III Kythera follows a trajectory of its own, leading to a less obscure EB III settlement pattern as a result of the Minoan/Helladic interaction or its role as a stepping stone in combination with its insular character. Despite the variation in EB III, the settlement patterns of the MBA seem to fall back in line with those on Crete, leading eventually to another demographic peak in the later MBA/early LBA (MM III-LM IA).

8.3.2 Regional scales in southern Aegean landscapes

As was discussed in Chapter 2, a comprehensive assessment of the southern Aegean requires its investigation on different regional scales. It was suggested that any single region is potentially defined by particular environmental characteristics, or proportional combinations of characteristics that are not the same in other regions. This definition relates more to a geographical concept of the term, which is why for the purpose of this investigation the term 'region' was defined as a space that is perceived as or determined by us to be distinct from other spaces in the same landscape and at a set scale of investigation (in our case the Aegean as a whole). Such perceptions or determinations may be influenced by both environmental and socio-economic/political factors.

When considering Renfrew's cultural divisions, it is clear that, geographically-speaking, the Methana Peninsula and the Fournoi Valley form part of the Greek Mainland. Kythera is closer to the Mainland than to Crete, but its insular character and location on the western edge of the Cretan Sea mean that in fact this is the only one of the three areas that actually traverses the boundary between the Mainland and Crete. This is also reflected in cultural terms, as seen in the complex interaction between Mainland (Helladic) and Cretan (Minoan) style assemblages in the EBA. Such an integration of cultural traits is not unique to the EBA; the island reflects the links to both areas even today, serving as a reminder that insularity does not inherently imply cultural isolation and that geographical divisions do necessarily define cultural ones. This is also highlighted in the FN-EBA cultural assemblages of Methana and the Fournoi Valley: although geographically both areas form part of the northeast Peloponnese (more so the Fournoi Valley), ceramic material has been linked primarily to the Saronic Gulf and the Cyclades. At a first level, therefore, all three areas demonstrate the need to explore regional patterns free of assumptions as to what wider cultural regions they should belong to simply because of their geographical location.

The second scale that this research has dealt with is that of micro-regions within each investigated area. Methana and Kythera are clearly dissected geomorphologically, the former by the mountainous interior of the peninsula, the latter by steep gorges and drainages. The Fournoi Valley has little internal geographical differentiation, and it can be seen as constituting a micro-region in itself, within the wider region of the southern Argolid. In terms of cultural affiliations, the whole southern Argolid seems to be more linked to the Saronic Gulf and the Cyclades also. What becomes clear, however, is a marked difference in the distribution of material between the Fournoi Valley (the Fournoi Focus in particular) and the rest of the southern Argolid, particularly in terms of the number and range of ceramic shapes and the volume of obsidian raw material and tool production debris. Cultural assemblages on Methana have indicated that the geographical division of the peninsula into smaller sub-regions is not accompanied by cultural differentiation. On Kythera, however, the presence of most Minoanising EB III material in the Palaiopolis coastal area in contrast to the more Helladic interior highlights the cultural differentiation between different parts of the island.

A third scale concerns settlement location with regard to a community's perception of the landscape. Variations on this scale were demonstrated when exploring surface curvature (relief) for settlements and their assigned wider activity areas. On Kythera, surface curvature became significant on a medium scale, i.e. when settlement location took into account a surrounding area of ca. 6.25 ha, which conveniently corresponds to the analytical catchments of ca. 7 ha used throughout. This suggests that communities on Kythera were placing importance on the surrounding area rather than just the location of dwellings. The significance of surface curvature for the Fournoi Valley settlements only on the smallest scale suggests its importance for the location of the settlement itself in a landscape that is of positive subsistence value throughout, but with the constant threat of flooding. The significance of surface curvature on both small and medium scales on Methana suggests that direct settlement vicinity and the surrounding area were important, but also that the people moving into Methana were aware of the landscape's potential for erosion and its effect on settlement. Furthermore, the continuing significance of surface curvature across a number of successive 'window sizes' on Methana may highlight the fact that there are thresholds at which changes in scale will be meaningful to populations, and will therefore influence their interaction with the landscape. It is essential that the effect of scale be considered when engaging in regional studies.

The issue of regional scales ties in with that of marginality and the forms it takes in the southern Aegean. In Chapter 2, three types of marginality were described: environmental, spatial and cultural. Methana is clearly the most environmentally marginal (climatically and topographically), yet this did not seem to inhibit settlement in the FN-EBA, nor in subsequent periods for that matter. Spatial and cultural marginality seem to be more important. All areas show some form of spatial marginality: Kythera's insular character separates it from the Peloponnese and Crete, Methana's narrow mountainous isthmus attributes the peninsula an almost insular character, whereas the high mountain ranges in the north separate the southern Argolid and therefore the

Fournoi Valley from the rest of the Peloponnese. Concepts of region and marginality are relevant to understanding the variations in social development across the southern Aegean and possibly why some areas developed later into palatial centres and others did not. Jameson *et al.* (1994: 11) argued that 'throughout its history the southern Argolid, like the great majority of the small, distinct areas of the Aegean, has been a follower, not a leader. [...] In the southern Argolid we are usually looking at the effects, not the sources, of the regional and supra-regional developments that have been the decisive forces throughout its long life.' In a similar way Methana's semi-insular character and rugged terrain has allowed it a varying degree of isolation, which is perhaps why it was used as a refuge by the French during the War of Independence, or why there was no direct control by the Turks during the 18th century AD (Forbes 1997b: 107). Therefore, spatial marginality may have helped towards the assertion of more cultural marginality.

The developments during the FN-EBA were explored in their own right throughout this thesis, but now is the time to think of the three areas in the wider framework of southern Aegean processes throughout the Bronze Age. It has been shown that the variations observed between them were the result of varying local environments and local community choices. One of the similarities in all three areas is the rather peripheral nature of the developments when comparing them to processes in more central areas, such as the Argos plain of the Peloponnese and Aegina in the Saronic Gulf, where central places like Lerna, Tiryns and Kolonna reached more complex levels of social structure and integration. What becomes evident is that even if Methana and the Fournoi Valley are spatially isolated, the major sites seem to go on in EB III, as observed in other areas also (whether any of the settlements were destroyed at some point towards the end of EB II or the beginning of EB III cannot be established based on the survey data). Therefore it appears that even in EB III these two areas at least follow a more general northeast Peloponnesian pattern, albeit on a much smaller scale. Whitelaw's suggestions that a major difference between Mallia and Mochlos is the lack of hinterland for the latter (Whitelaw 2004: 238) could explain why the Fournoi Valley does not develop into a major centre at any time throughout the Bronze Age. Its rather marginal location in spatial terms, fairly out of the way compared to the Argos plain for instance, is likely to have been a contributing factor. Kythera remains a notable exception, but both Methana and the Fournoi Valley lose their settlement networks and confirm the dearth of settlement in EB III. Wiessner's (2002) proposition of cycles of development seems to fit the available data more accurately, as it takes into account the alternate peaks and lapses in settlement across the phases.

8.4 Future directions

How possible is it to compare all surveys and produce a more holistic picture of the southern Aegean? Properly compared survey data can offer the key means of exploring the Aegean mosaic composed of different micro-regions within regions and different micro-environments within environments at a range of scales. Rather than try to create a generalised picture of the Aegean, survey provides an excellent way of obtaining data for different areas and exploring them comparatively. This research has focused on three areas with fairly distinct variations in settlement and environment, but of a similar nature in terms of their distance to the more central areas. When discussing settlements that are primarily subsistence-oriented, the environment will inherently play a major role. Although the dangers of environmental determinism are accepted, it would be equally wrong to exclude environmental factors and their potential influence on settlement location in such communities. These elements need to be combined with indications of cultural choice.

When considering the impact of regional data for the rest of the southern Aegean, the variations in patterns discussed here may be subtle, but show that, on the one hand, we cannot extrapolate detailed phenomena from particular areas to the whole Aegean, or even to wider regions within the Aegean such as the Peloponnese, without careful examination of the evidence throughout. On the other hand, it has shown that the broader similarities in human settlement and development can be explored in order to examine other areas with less archaeological evidence.

One of the most important issues associated with a comparative approach that has been discussed throughout this thesis is that of scale and resulting resolution. At a time when the incorporation of survey data into GIS is becoming increasingly popular, Aegean survey finds itself with a patchwork of digital maps and elevation models of inconsistent levels of accuracy that have been produced from paper maps of varying scales and through a variety of software. The development of remote sensing and the acquisition of topographic and other landscape data through satellite images is one of the most promising avenues for improving the datasets and setting standardised digital formats. There are numerous satellite sensors (e.g. QuickBird [http://www.ballaerospace.com/quickbird], IKONOS [http://www.satimagingcorp.com/gallery-ikonos], ASTER [http://asterweb.jpl.nasa.gov] and SRTM [http://srtm.usgs.gov/]), that provide low cost, high resolution and/or multi-spectral images that can be used in archaeological investigations. However, even in this case, different satellites produce varying qualities of data. For example QuickBird and ICONOS produce images with fewer bands but of finer resolution and are appropriate for site location and mapping of survey tracts, whereas ASTER images have coarser resolution but a greater number of bands that allow one to pick out various important landscape attributes, such as modern vegetation or geology. As in most stages of survey investigation, careful choice and use of appropriate tools is essential. However the incorporation of satellite data such as from ASTER, which works on a global scale, will greatly enhance the comparability of datasets in the field.

A next step for research of this kind would be to attempt to incorporate more types of archaeological landscapes, for example a wider range of micro-environments. Some may say that this approach risks comparing 'apples and oranges', but in fact it creates a framework within which we are able to understand how communities develop in a wide range of environments and to ask questions about why similar environments see different social trajectories and why different environments see similar trajectories. It allows us to move from strict environmental determinism to human agency and to see how these interact to bring about the economic and socio-cultural phenomena of the past. Survey therefore highlights the dynamic picture that the Aegean truly exhibits, rather than simply fitting all of its data into a single narrative. This may ultimately lead us to understand the finer details of FN-EBA development and even why certain areas take off in the MBA and LBA and others do not.

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ILLUSTRATIONS

Chapter 1

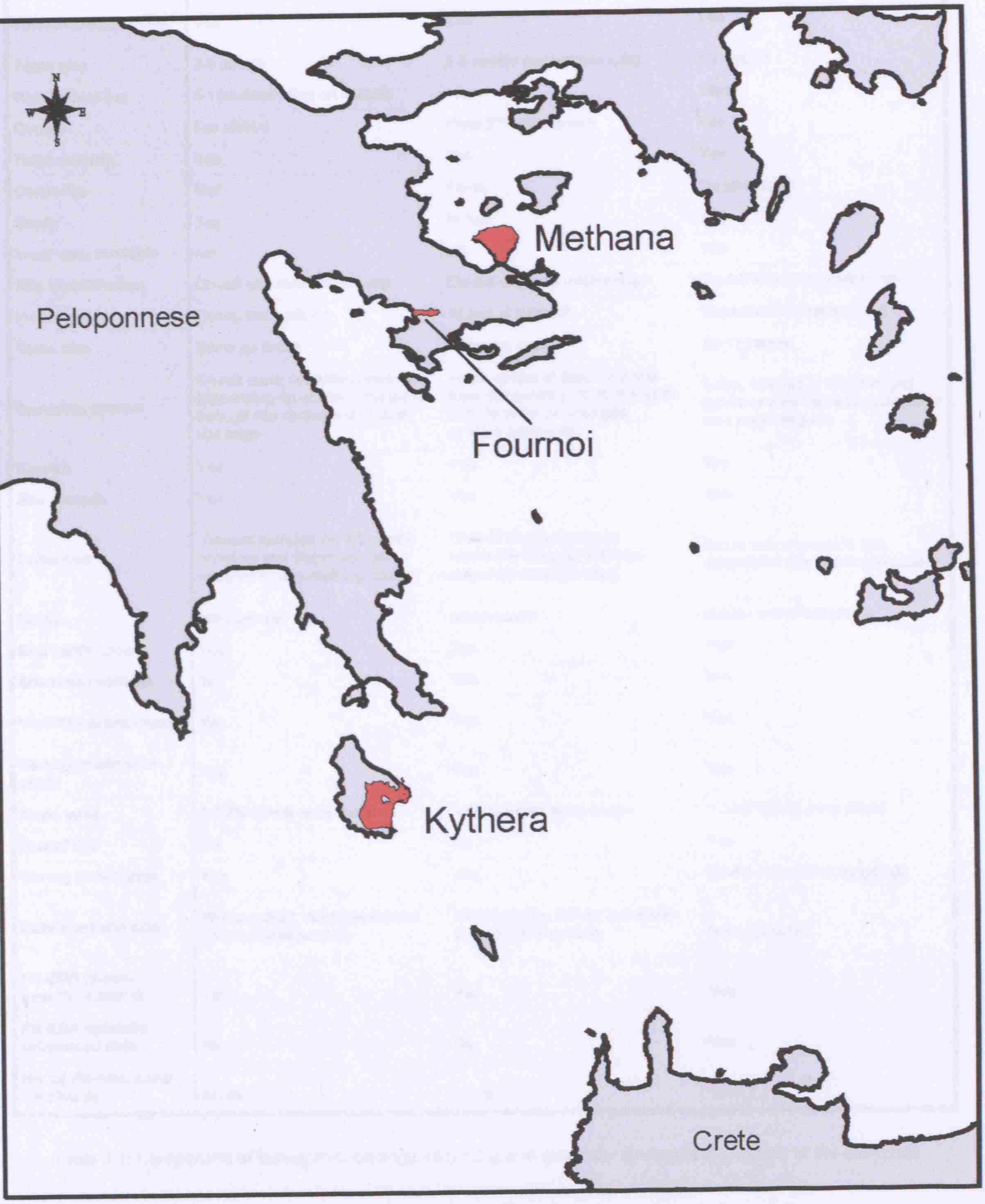


Figure 1.1: The three areas investigated in this research: Kythera, Methana and Fournoi

Chapter 3

Criteria	Argolid Exploration Project	Methana Survey	Kythera Island Project
Overall sampling strategies	Purposive	Purposive	Combination of probabilistic and purposive
% of survey area fieldwalked	20% (intensive and extensive)	20% (intensive)	43% (intensive)
Tract implementation	Yes	Yes	Yes
Team size	3-5 people	5-6 people (sometimes split)	5-7 people
Walker spacing	5-15m depending on visibility	10m	15m
Counts	Not always	From 2nd field season	Yes
Tract records	Yes	Yes	Yes
Collection	No?	Rarely	Diagnostics
Study	Yes	In field	Yes
Tract data available	No	No	Yes
Site identification	On-/off-site data relationship	On-/off-site data relationship	On-/off-site data relationship
Investigation	During tractwalking	At end of transect	Separate from tractwalking
Team size	Same as tracts	Same as tracts	10-11 people
Sampling system	One or more 1m-wide corridors (depending on scatter size) pass through site centre and end on site edge	1sq.m circles at fixed intervals from site centre in N, E, S and W directions (large sites grid or small transects)	5x5m, 10x10m or 20x20m grid (grabs or mini-tracts for scatters of very poor integrity)
Counts	Yes	Yes	Yes
Site records	Yes	Yes	Yes
Collection	Vacuum samples from 1m-wide corridors and diagnostic grab samples from remaining scatter	Grab of diagnostics from whole site (degree of spatial reference for large sites)	5sq.m vacuum circles and diagnostics from each grid square
Study	Macroscopic	Macroscopic	Macro- and microscopic
Site verification	Yes	Yes	Yes
Site data available	Yes	Yes	Yes
Visibility assessment	Yes	Yes	Yes
Geomorphological study	Yes	Yes	Yes
Maps used	1:5000 Greek army maps	1:5000 Greek army maps	1:5000 Greek army maps
Use of GIS	No	No	Yes
Survey publication	Yes	Yes	Prelim. report only (ongoing)
Published site size	Whole scatter, not for individual chronological periods	Whole scatter, not for individual chronological periods	Not applicable
FN-EBA phase-specific material	Yes	Yes	Yes
FN-EBA spatially referenced data	No	No	Yes
No. of FN-EBA sites/ > 5 sherds	84/46	51/26	100/72

Table 3.1: Comparison of survey methodology, recording and collection strategies and quality of FN-EBA data

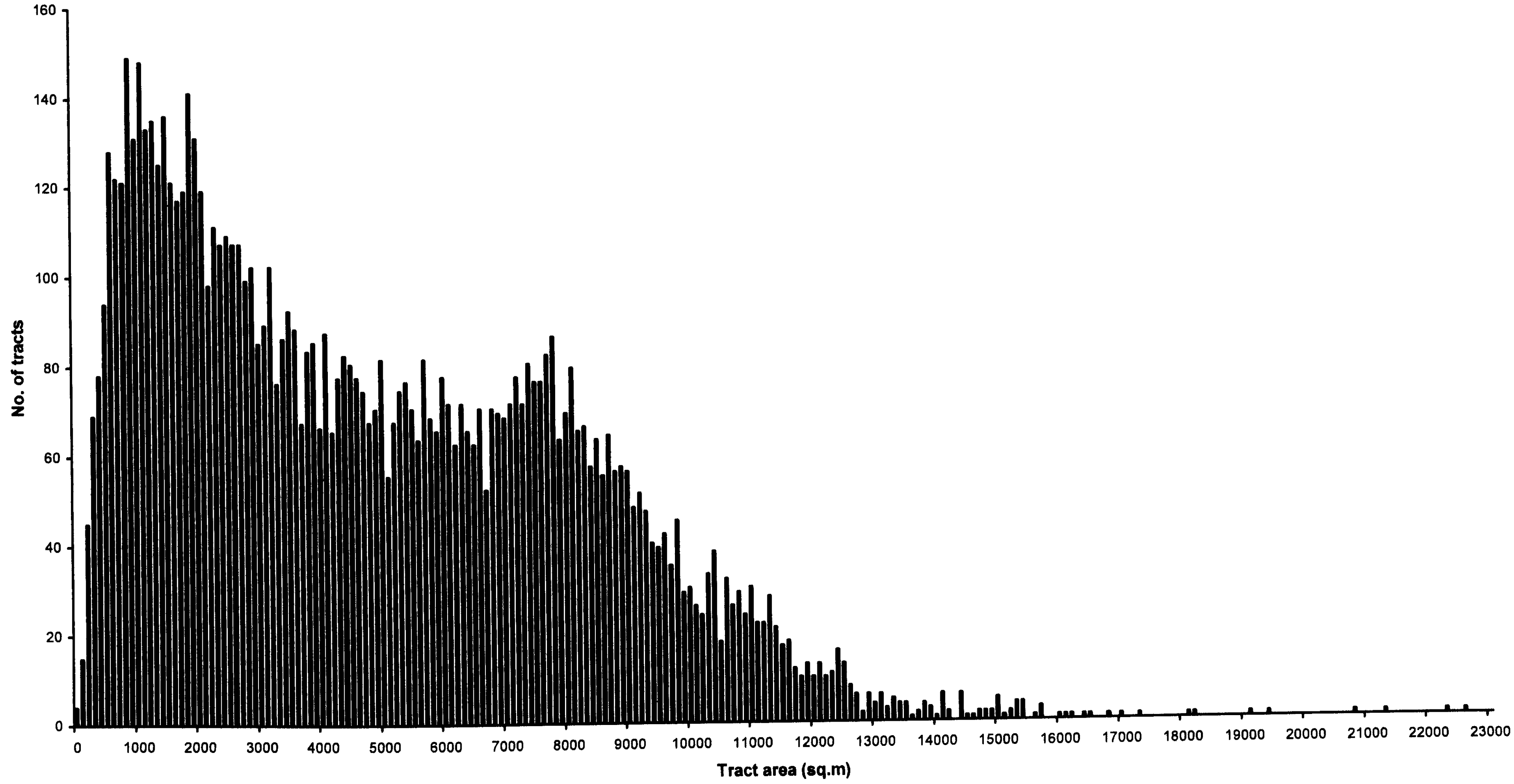


Fig 3.1: KIP tracts plotted by size (92% of tracts are under a hectare)

Chapter 4

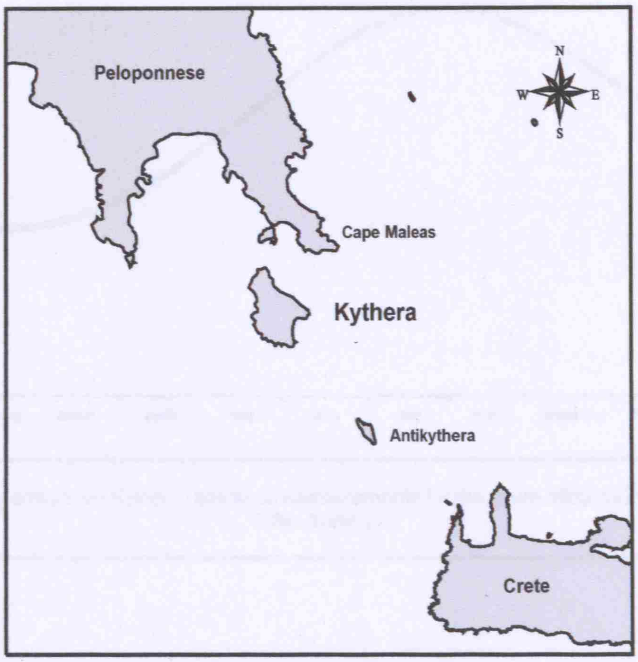


Figure 4.1: Kythera in its wider setting

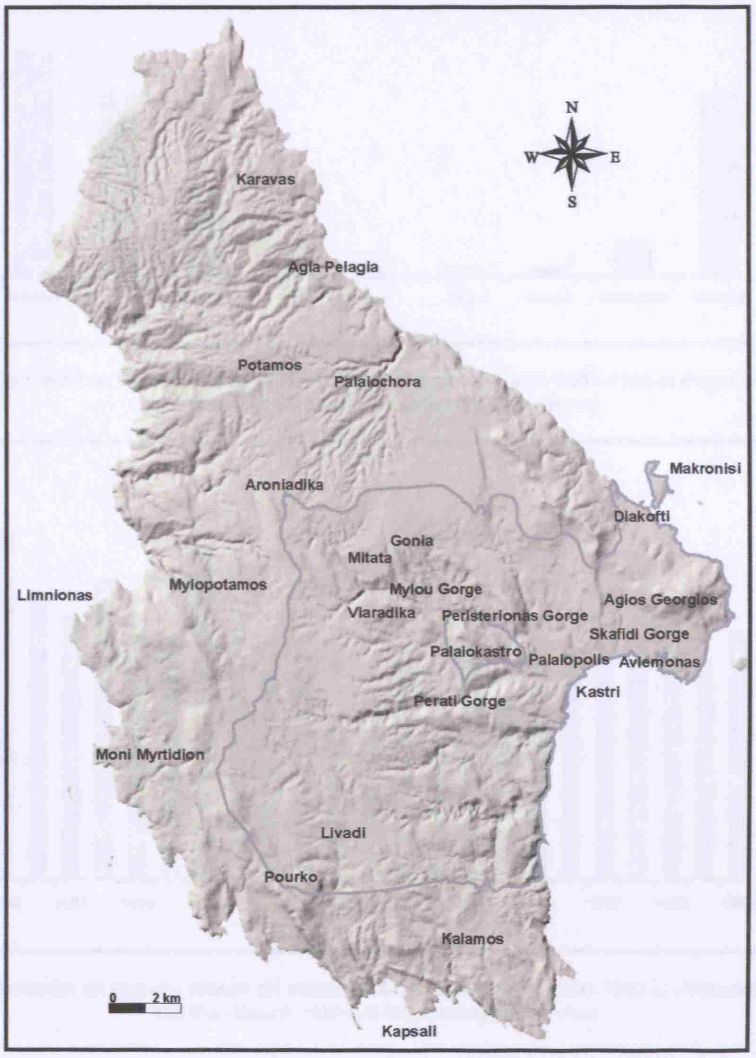


Figure 4.2: Kythera with the areas discussed in sections 4.1 and 4.2

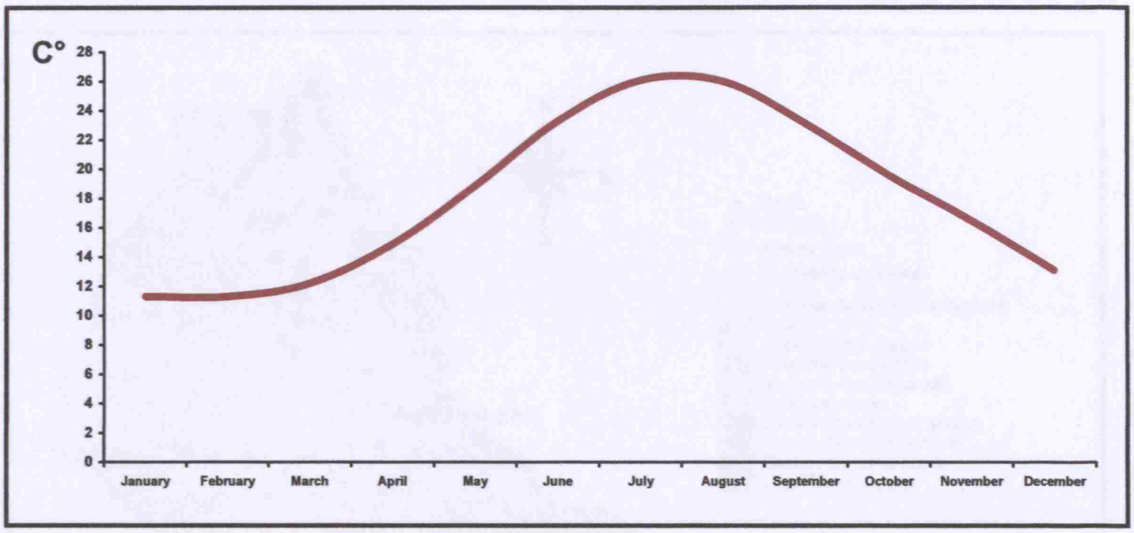


Figure 4.3: Average temperature on Kythera (based on measurements for the years 1960-1971 in Pagounis & Gertsos 1984: Table 2)

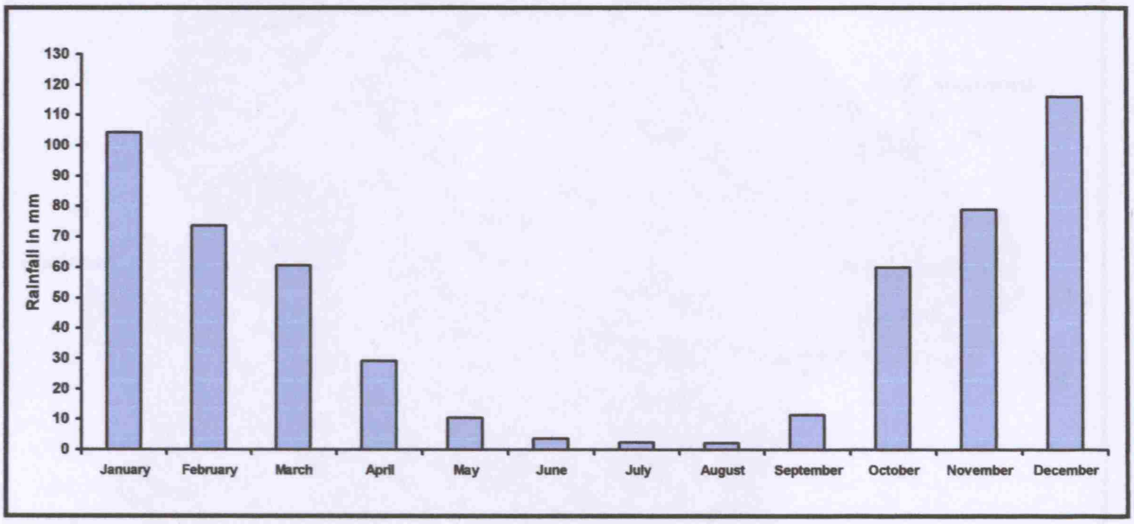


Figure 4.4: Average rainfall on Kythera (based on measurements for the years 1960-1989 in Pagounis & Gertsos 1984 and the Hellenic National Meteorological Service)

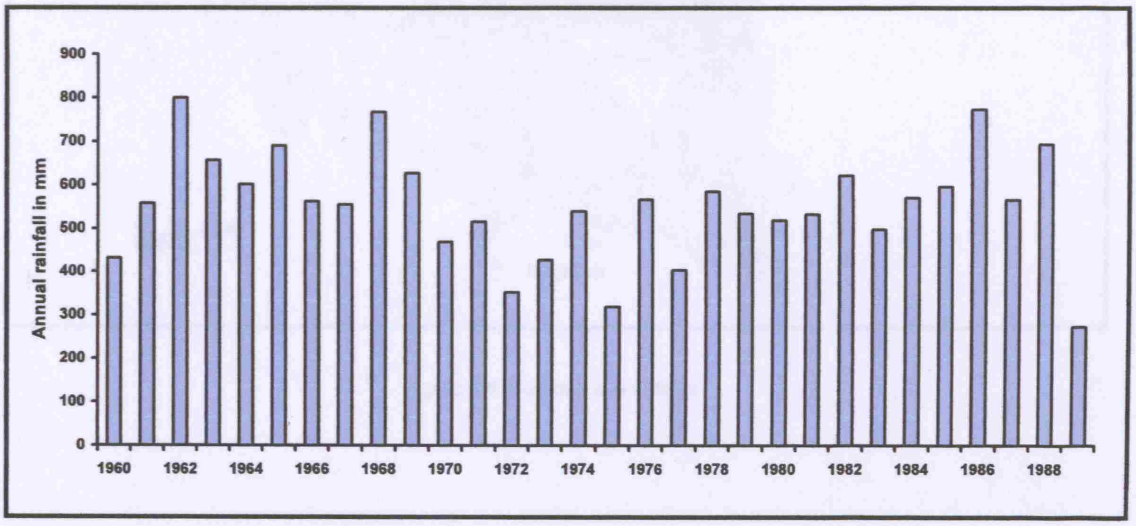


Figure 4.5: Annual rainfall on Kythera (based on measurements for the years 1960-1989 in Pagounis & Gertsos 1984 and the Hellenic National Meteorological Service)

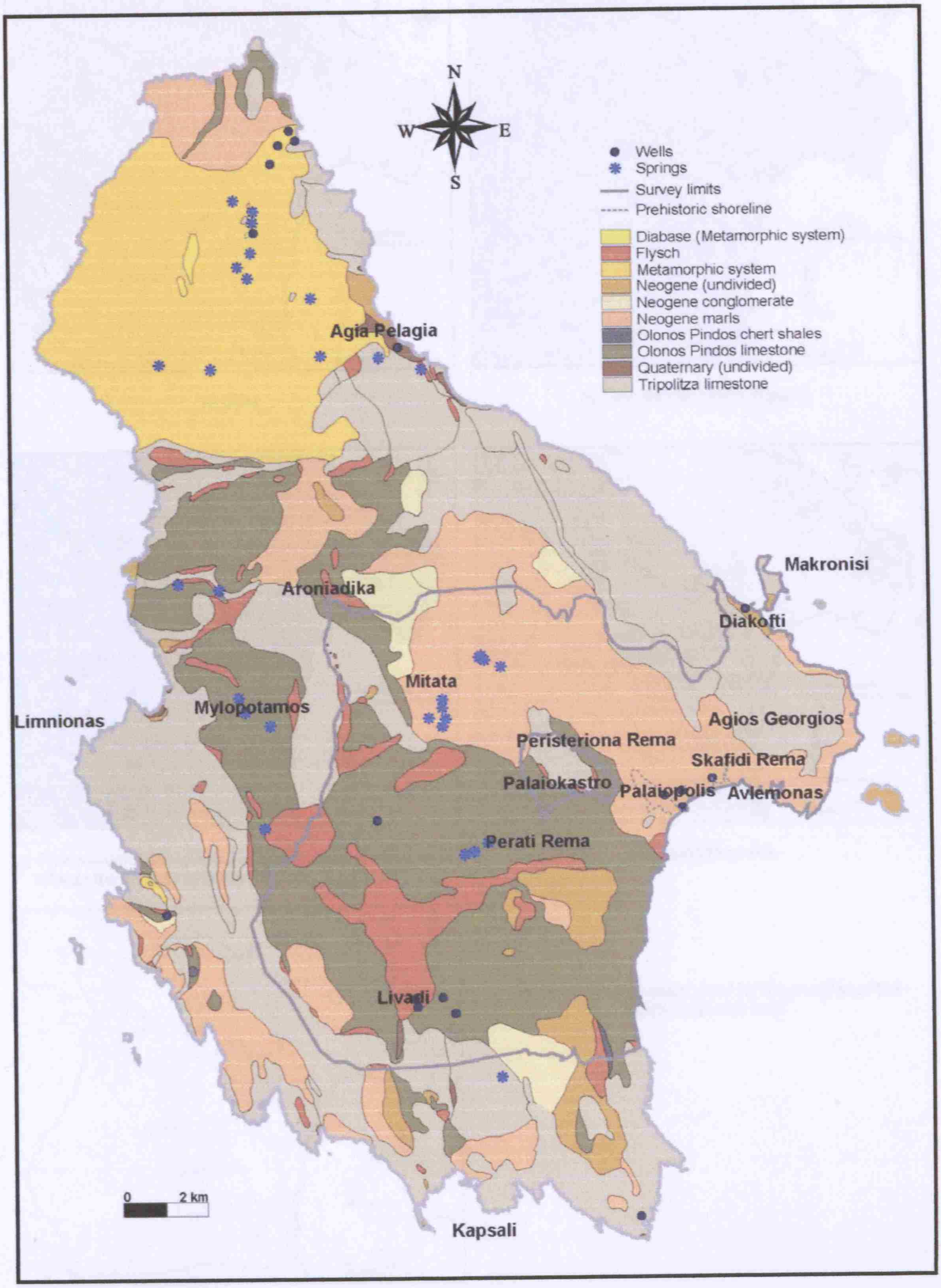
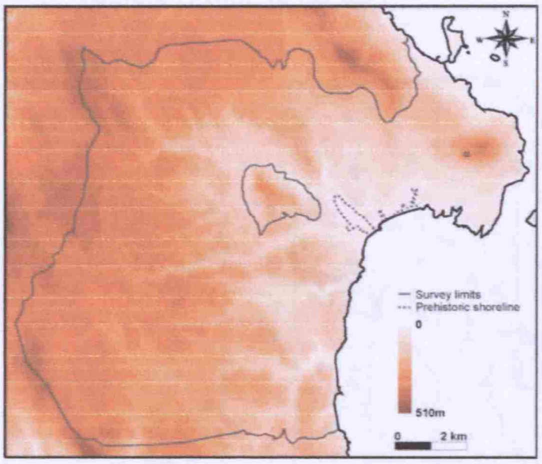
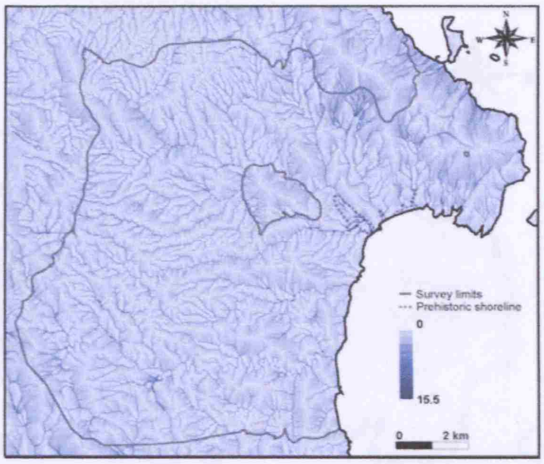


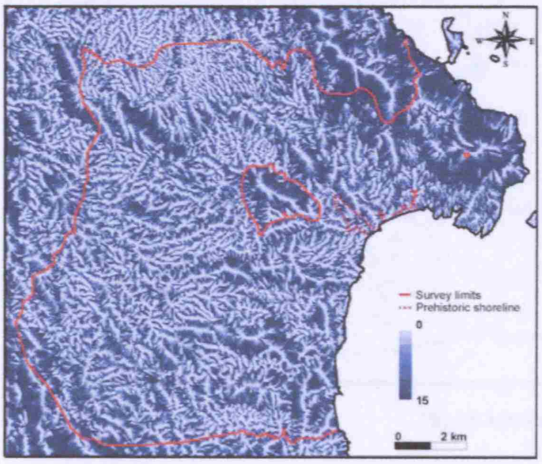
Figure 4.6: Geology and springs



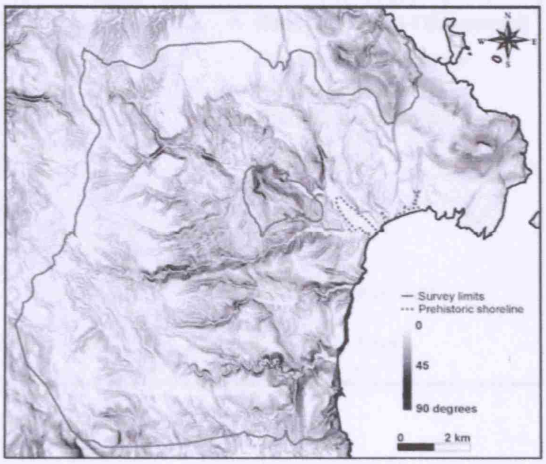
a) DEM



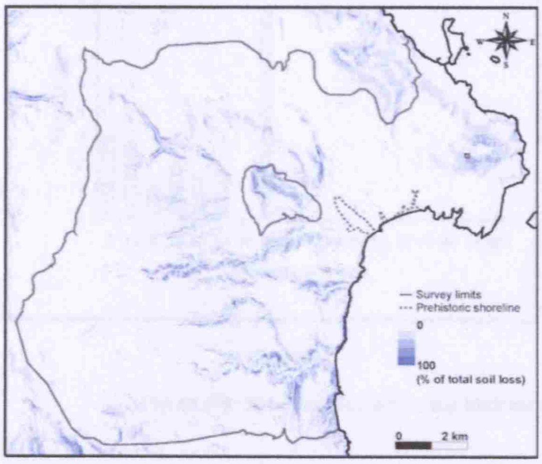
b) Flow accumulation (logged)



c) Flow accumulation (modified; the maximum value of 15 reflects the 15 cell restriction of slope length to 150m)



d) Slope steepness



e) Relative soil loss

Figure 4.7: Digital maps used for the creation of the relative soil loss map

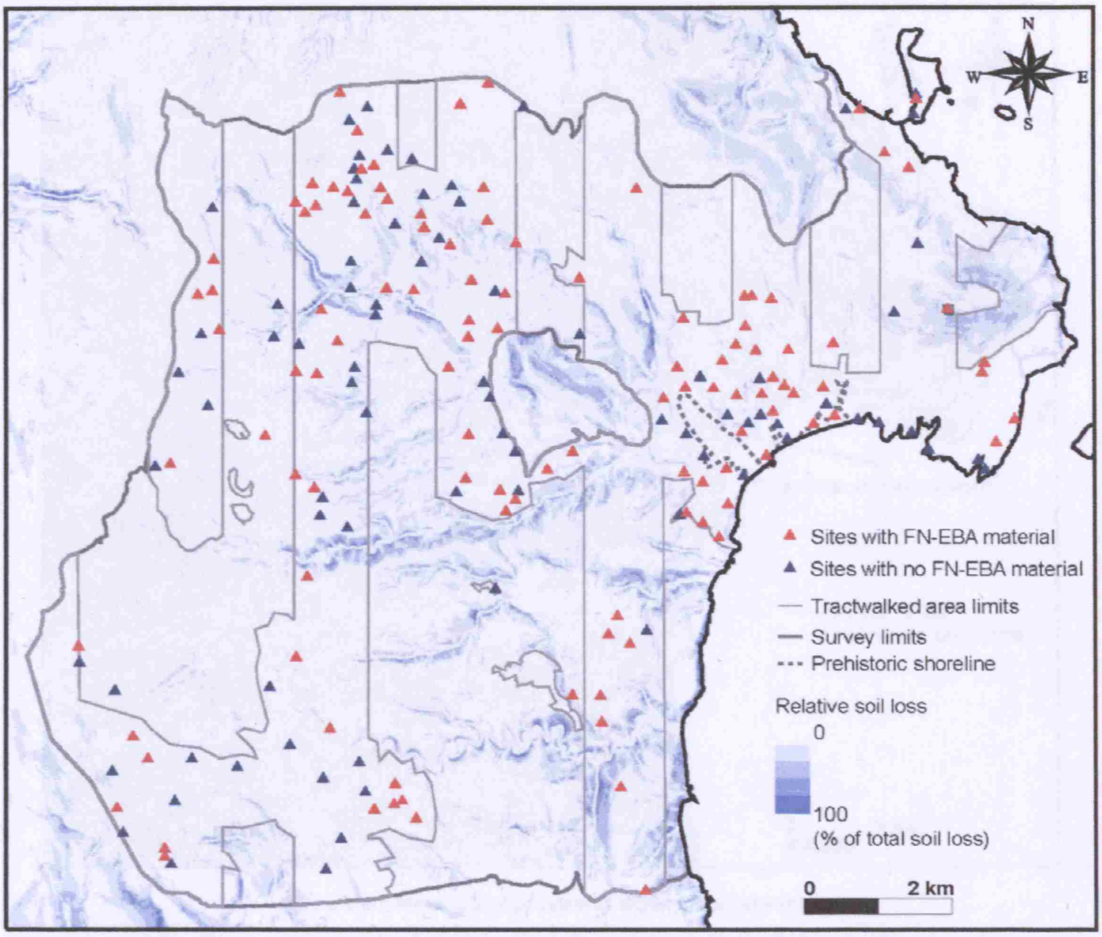
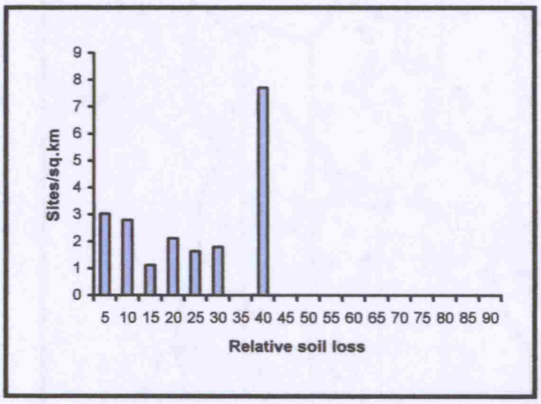
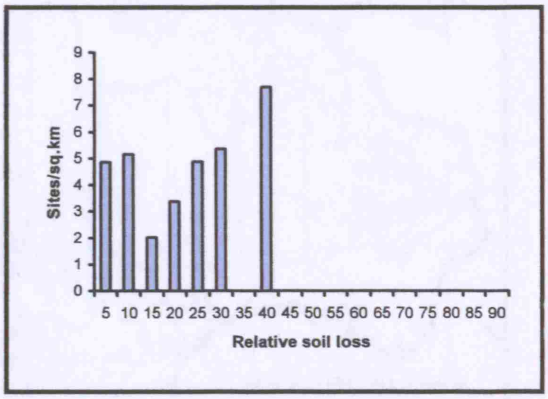


Figure 4.8: Relative soil loss



a) FN-EBA



b) All sites

Figure 4.9: Site densities within the tractwalked area within each relative soil loss category

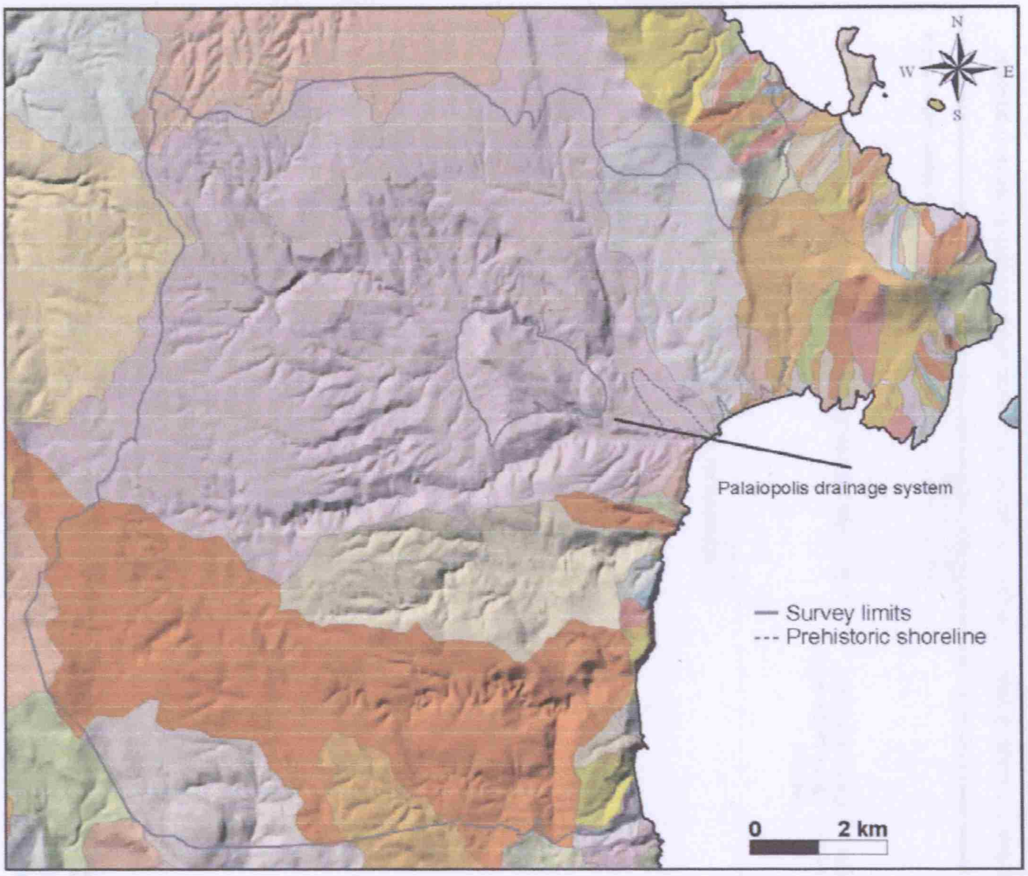


Figure 4.10: Major drainage systems within the survey area

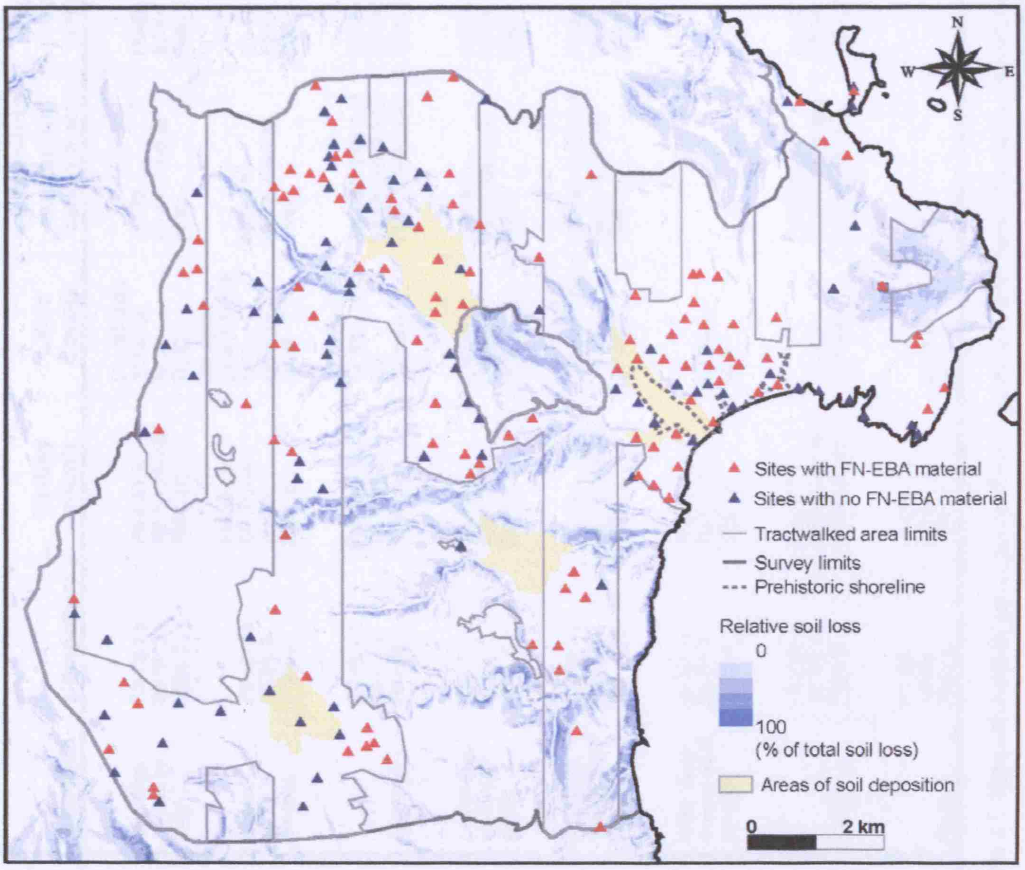


Figure 4.11: Soil deposition areas over relative soil loss

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
001c	Low ridge divided by gully	FN-EB I: x EB II+: 2 FMin: ?	FN-EB I: x EB II+: 26(22) FMin: (1)	Ch: 3/3 (obs: 1EBA; (2) Neo) G: 10	FN-EB I: - EB II+: 0.1-0.55 FMin: -	FN-EB I: - EB II+: 2.3 FMin: -	FN-EB I: - EB II+: settlement FMin: -	Main FN-EBA concentration in area C (SE of site), and few very abraded sherds also in area A to the N, over the shallow gully; groundstone (grnd.) in different areas; material prob. rolling in W, S and E directions where there is alluviation; sherds fairly abraded; related EB II+ tract sherds
003	Slopes/ some terraced	FN-EB I: x EB II+: 3 FMin: x	FN-EB I: x EB II+: no counts FMin: x	Ch: 33/24 (obs: 4 FN;10 EBA; 1FNEBA) G: 20	FN-EB I: - EB II+: 0.4-1.86 FMin: -	FN-EB I: - EB II+: 0.7 FMin: -	FN-EB I: - EB II+: settlement FMin: -	FN-EBA study; site limits pos. beyond grid but not too far; FN-EBA in NW corner; material prob. rolling SE down slope; no spatial correlation between grnd. and EB II+ scatter; obs. just beyond main sherd scatter; disturbed by later occupation; no material on slopes above site, but related EB II+ tract sherds further down slope
004*	Low knoll	FN-EB I: 3 EB II+: 3 FMin: 3	FN-EB I: 24(2) EB II+: 24(11) FMin: 7(1)	Ch: 44/6 (obs: 14 EBA; (5) FN) G: None	FN-EB I: 0.02-0.13 EB II+: 0.023-0.25 FMin: 0.003-0.025	FN-EB I: 0.65? EB II+: 0.12? FMin: 0.025	FN-EB I: settlement EB II+: settlement FMin: settlement?/ cemetery?	V. disturbed; v. abraded; poor visibility around site centre; N and E edges clearer; obs. and grnd. within FN-EBA scatter; FN-EB I on knoll, site centre, road section, and pos. in between under vegetation; EB II+ same, but more sherds and more widely scattered; less Fmin, on E edge; one of the longest lived sites; related FN-EB I/FMin tract sherds
006*	Low plateau/ steep gully slopes	FN-EB I: x EB II+: 3 FMin: x	FN-EB I: x EB II+: 29 FMin: x	Ch: 0/4 (3EBA) G: 2	FN-EB I: - EB II+: n/a-0.16 FMin: -	FN-EB I: - EB II+: 0.06 FMin: -	FN-EB I: - EB II+: settlement FMin: -	Quadrants; v. abraded scatter on plateau with limited soil cover and on steep slopes to W; soil eroding down slope and material prob. rolling also; material depleted; site was prob. confined to plateau; known precise location of diagnostic sherds within quadrants used for suggested size; related EB II+ tract sherds
008*	Prominent narrow ridge/ slopes	FN-EB I: 2 EB II+: 3 FMin: (1)	FN-EB I: 16(1) EB II+: 182(13) FMin: 1	Ch: 13/6 (obs: 3 EBA) G: 18(1)	FN-EB I: 0.005-0.8 EB II+: 0.1-1.18 FMin: -	FN-EB I: 0.04 EB II+: 0.16 FMin: -	FN-EB I: settlement EB II+: settlement FMin: -	Dense scatter on ridge top with thin soil, esp. N, partly retained by wall enclosure; material rolling down tip and slopes, settling in flatter areas below (related EB II+ tract sherds); sherds small and abraded prob. result of erosion and livestock; EB II+ denser and more extensive; grnd within FN-EBA, obs. within EB II+; site confined to ridge top; long lived
011	Knoll/ steep slopes/ some terraced	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: (1) FMin: x	Ch: None G: 3	-	-	-	Quadrants/grab; located 500m NE (and downhill) of 004; very abraded sherd
013	Fields	FN-EB I: x EB II+: 2 FMin: 2	FN-EB I: x EB II+: no info. FMin: no info.	Ch: 0/1 G: None	FN-EB I: - EB II+: n/a-no info. FMin: n/a-no info.	FN-EB I: - EB II+: not possible FMin: not possible	FN-EB I: - EB II+: settlement? FMin: settlement?	Grab; very abraded sherds; limited information available
016	Fields	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: (2) FMin: x	Ch: 11/6 G: 1	-	-	-	Very abraded sherd; in geomorphologically active Mitata valley, 550m below site 008

Table 4.1: Sites with FN-EBA pottery and/or lithics on Kythera (Components: ? possible material; (1) insignificant; 1 small; 2 minor; 3 major; * no other major component – Artefact counts: () possible material; + more than registered – Lithics: Ch chipped stone (obsidian/other); G ground stone – L: Dating based on chipped stone

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
017	Sloping fields	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: (2) FMin: x	Ch: 0/6 G: None	-	-	-	Very abraded sherds; in geomorphologically active Mitata valley
019	Terraced slopes	FN-EB I: 2 EB II+: 2 FMin: x	FN-EB I: several EB II+: 1+ FMin: x	Ch: None G: 1 (EBA?)	FN-EB I: n/a-not possible EB II+: no info. FMin: -	FN-EB I: not possible EB II+: not possible FMin: -	FN-EB I: settlement? EB II+: settlement? FMin: -	Small, very abraded sherds; limited info. on EB II+; no FN-EB I within grid but several chert pieces in nearby tracts (ids 3125, 3127, 3149, 3140; only few sherds entered in tract pottery database); land use: cultivation and livestock; material pos. rolling down NW slopes of knoll; in geomorphologically active Mitata valley
020	Terraced fields on edge of rema	FN-EB I: 2 EB II+: 2 FMin: ?	FN-EB I: several EB II+: several FMin:	Ch: None G: None	FN-EB I: no info. EB II+: no info. FMin: -	FN-EB I: not possible EB II+: not possible FMin: -	FN-EB I: settlement? EB II+: settlement? FMin: -	Quadrants/grab; seriously disturbed site; very abraded sherds; in geomorphologically active Mitata valley; related EB II+ tract sherds
023*	Plateau	FN-EB I: 1L EB II+: 3L FMin: x	FN-EB I: ? EB II+: ? FMin: x	Ch: 69/45 (obs: 27(1) EBA; 3 FNEBA) G: None	FN-EB I: n/a-no info. EB II+: n/a-no info. FMin: -	FN-EB I: not possible EB II+: not possible FMin: -	FN-EB I: ? EB II+: settlement?/ tool production? FMin: -	Quadrants/grabs-FN-EBA study; poor visibility in most areas; mainly lithic scatter; very abraded sherds; area of low geomorphological activity, but extensive grazing has resulted in the depletion of the sherd scatter; related EB II+ tract sherds
024	Fields on ridges intersected by rema	FN-EB I: x EB II+: (1) FMin: x	FN-EB I: x EB II+: 1 FMin: x	Ch: None G: 1	-	-	-	Minitracts; very abraded sherd; in geomorphologically active Mitata valley
025	Terraces	FN-EB I: x EB II+: x FMin: ?	FN-EB I: x EB II+: x FMin: no info.	Ch: 0/1 G: 1	-	-	-	Quadrants; in geomorphologically active Mitata valley; may have been disturbed by later occupation
027	Shallow gully	FN-EB I: x EB II+: x FMin: ?	FN-EB I: x EB II+: x FMin: (1)	Ch: None G: 1	-	-	-	Grab? Very abraded sherd; No other site in the area
029*	Plateau/ promontory /slopes/ on cliff edge	FN-EB I: (1) EB II+: 3 FMin: x	FN-EB I: 1 EB II+: 22 FMin: x	Ch: 8/0 (7 EBA) G: 7 (probably EBA)	FN-EB I: - EB II+: 0.28-0.4 FMin: -	FN-EB I: - EB II+: 0.21 FMin: -	FN-EB I: - EB II+: settlement FMin: -	Very abraded sherds; site edge not clear to the S; overall good visibility; denser scatter on higher ridge section within field walls; obs. and most of grnd. within areas of high sherd density; high EB II+ tract sherd counts also from high density areas; few sherds prob. rolling down ridge slopes

Table 4.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
030	Slopes and track	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: (1) FMin: x	Ch: 1/0 G: None	-	-	-	Grabs; directly below site 008
031	Fields	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: (2) FMin: x	Ch: 1/2 G: 2	-	-	-	Very abraded sherds; could be rolling down slope from outside the tractwalked area
032	Plateau/ ridge and terraced fields	FN-EB I: x EB II+: 2 FMin: 2	FN-EB I: x EB II+: 7(5)+ FMin: 1+	Ch: 1/1 (obs: EBA) G: None	FN-EB I: - EB II+: 0.05-0.07 FMin: no info.	FN-EB I: - EB II+: 0.07? FMin: not possible	FN-EB I: - EB II+: settlement FMin: settlement?	Very abraded material; partly disturbed; all edges defined; FN-EBA comes from E tip of ridge and also from rock pile and field in front of it; EB II+ spatial integrity questionable
033	Fields/ terraces	FN-EB I: x EB II+: (1) FMin: x	FN-EB I: x EB II+: 2(2) FMin: x	Ch: None G: 1	-	-	-	Minitracts; very abraded sherds; in vicinity of sites 029 and 032
037	Small knoll	FN-EB I: 2 EB II+: 2 FMin: x	FN-EB I: 1+ EB II+: 6(5)+ FMin: x	Ch: 7/2 (obs: 4 FN; oth: 1 FN) G: None	FN-EB I: no info. EB II+: 0.12-0.36 FMin: -	FN-EB I: not possible EB II+: 0.08 FMin: -	FN-EB I: ? EB II+: settlement FMin: -	Site edges hard to define; diffuse scatter across grid except SE; v. abraded material, prob. eroding from knoll top where visibility is poor (site size based on this premise); lithics located on S knoll slope; prob. disturbed by later occupation
038	Fields	FN-EB I: ? EB II+: ? FMin: x	FN-EB I: no info. EB II+: no info. FMin: x	Ch: 1/0 (EBA) G: None	-	-	-	Grabs-Overview; on the edge of the tractwalked area
041-042	Small knoll	EBA: ?	EBA: None	Ch: 1/0 (EBA?) G: 2	-	-	-	On the edge of the tractwalked area
047	Gentle slopes under rocky shelter	FN-EB I: 1L EB II+: 1L FMin: x	FN-EB I: None EB II+: None FMin: x	Ch: 28/13 (obs: 5(1) EBA; 2(1) FN; 1 FNEBA) G: 1	FN-EB I: 0.04 EB II+: 0.04 FMin: -	FN-EB I: ? EB II+: ? FMin: -	FN-EB I: tool production? EB II+: tool production? FMin: -	Prelim. study; disturbed by quarrying and bulldozing; FN-EBA is lithic component only, located along cliff edge to the W

Table 4.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
049	Plateau overlooking rema/ slopes/ terraces	FN-EB I: x EB II+: 2 FMin: x	FN-EB I: x EB II+: 4(2)+ FMin: x	Ch: None G: None	FN-EB I: - EB II+: 0.05-0.27 FMin: -	FN-EB I: - EB II+: 0.1 FMin: -	FN-EB I: - EB II+: settlement? FMin: -	V. abraded sparse material; site edge not defined in NW (heavy vegetation cover); seriously disturbed by later occupations and modern land use (recent clearing into rock piles, terracing); definite and possible sherds not spatially related; material prob. rolling down slope into rema also; suggested site size not very secure
051	Hill top/ slopes	FN-EB I: x EB II+: 2 FMin: x	FN-EB I: x EB II+: several FMin: x	Ch: None G: None	FN-EB I: - EB II+: no info. FMin: -	FN-EB I: - EB II+: not possible FMin: -	FN-EB I: - EB II+: ? FMin: -	Prelim. study; site edges partly obscured heavy vegetation cover; limited information available, but it would seem that the main concentration of material is located on hill top with more abraded sherds rolling down slope, particularly to SE
054	Knoll/ sloped terraces	FN-EB I: x EB II+: x FMin: (1)	FN-EB I: x EB II+: x FMin: 1	Ch: None G: None	-	-	-	FN-EBA study; no definite site in vicinity; could be rolling down fairly steep slope from outside the tractwalked area; in fairly dissected and geomorphologically active area behind Palaiokastro
055	Knoll/ steep slopes	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: (10) FMin: x	Ch: 1/1 (obs: FN?) G: None	-	-	-	Very abraded material; in fairly dissected and geomorphologically active area behind Palaiokastro; may have been disturbed by later occupation; possible EB II+ site
056	Knoll/ slopes	FN-EB I: ? EB II+: ? FMin: x	FN-EB I: no info. EB II+: no info. FMin: x	Ch: None G: 3	-	-	-	Overview; in fairly dissected and geomorphologically active area behind Palaiokastro; localised erosion noted within site area
057	Ridge	FN-EB I: x EB II+: 2 FMin: (1)	FN-EB I: x EB II+: 1(3) FMin: 1	Ch: None G: None	FN-EB I: - EB II+: n/a-no info. FMin: -	FN-EB I: - EB II+: not possible FMin: -	FN-EB I: - EB II+: ? FMin: -	Minitracts-FN-EBA study; diffuse scatter of material over extensive area; limited information available
060	Terraced fields	FN-EB I: x EB II+: x FMin: 1	FN-EB I: x EB II+: x FMin: 3	Ch: None G: 2	FN-EB I: - EB II+: - FMin: 0.01-0.74	FN-EB I: - EB II+: - FMin: 0.2?	FN-EB I: - EB II+: - FMin: settlement?	FN-EBA study; overall poor site integrity; disturbed by recent land use and eroding down slope; low FMin counts, however a discrete concentration of FMIN sherds from site 093 is also located within a few meters of site 060 and is prob. part of the same scatter; related Fmin tract sherds also present; suggested site size is tentative
064	Ridge/ fields	FN-EB I: 2 EB II+: 3 FMin: 3	FN-EB I: 30 EB II+: 141 FMin: no counts	Ch: 119/13 (obs: 14 EBA; (4) FN; 1 FNEBA) G: 14	FN-EB I: 0.02-5.5 EB II+: 0.17-10.8 FMin: 0.07-7.4	FN-EB I: 1.7 EB II+: 4.5 FMin: 4.9	FN-EB I: settlement EB II+: settlement FMin: settlement	FN-EBA study; high sherd densities for EB II+/FMin, lower for FN-EB I, broadly speaking, in fairly similar areas; geomorphological activity and recent land use have affected densities; overall material is located in areas of good visibility, though not exclusively; see main text for further details (chapter 4, section 4.4.3)

Table 4.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
067	Flat/ in vicinity of rock shelter	FN-EB I: x EB II+: 2 FMin: ?	FN-EB I: x EB II+: 6+ FMin: (1)	Ch: 6/0 (2 EBA) G: None	FN-EB I: - EB II+: 0.2-0.34 FMin: -	FN-EB I: - EB II+: 0.15? FMin: -	FN-EB I: - EB II+: settlement FMin: -	FN-EBA study; sparsely scattered EB II+ material on ridge top that seems to be rolling down the slopes; overall poor site integrity; suggested area is tentative
068	Gentle slopes/ channel terraces	FN-EB I: 1 EB II+: 2 FMin: 2	FN-EB I: no info. EB II+: 5(7)+ FMin: 7(6)+	Ch: 6/4 G: None	FN-EB I: no info. EB II+: 0.04-1.07 FMin: 0.12-1.6	FN-EB I: not possible EB II+: 0.08?? FMin: 0.1?	FN-EB I: ? EB II+: settlement? FMin: ?	Very abraded material; scattered over slopes (pos. rolling down them); area partly disturbed by bulldozing; suggested site size is tentative because of poor FN-EBA spatial integrity; site may be on NW edge of grid; related EB II+ and FMin tract sherds
069	Plateau	FN-EB I: x EB II: 1 FMin: 1	FN-EB I: x EB II+: 1(1)+ FMin: several	Ch: 21/47 (obs: 6(1) EBA; (2) FN) G: None	FN-EB I: - EB II+: 0.04-no spatial resolution FMin: no info.	FN-EB I: - EB II+: not possible FMin: not possible	FN-EB I: - EB II+: ? FMin: ?	FN-EBA study; overall poor site integrity, part of central area disturbed by bulldozing and/or rilling; material often small and abraded; limited FN-EBA spatial resolution
071	Gentle slopes/ terraces	FN-EB I: ? EB II+: x FMin: ?	FN-EB I: (few) EB II+: x FMin: (few)	Ch: 1/0 G: None	-	-	-	FN-EBA study; overall site integrity is quite good, though FN-EBA may have been disturbed by later occupation; possible FN-EBI and FMin site
072	Terraces	FN-EB I: x EB II+: 2 FMin: 2	FN-EB I: x EB II+: 21 FMin: 14	Ch: 17/4 (obs: 6 EBA; 1(1) FN; 1 FNEBA) G: None	FN-EB I: - EB II+: 0.12-2.64 FMin: 0.16-1.34	FN-EB I: - EB II+: 1.0 FMin: 0.28	FN-EB I: - EB II+: settlement FMin: settlement	FN-EBA study; visibility better in burnt areas; high concentrations in burnt and non-burnt; FN-EBA small and abraded; scattered across edge of plateau and on slopes below it; slope material prob. eroding from plateau; suggested size pos. on conservative side; one of the larger FN-EBA sites in the area; related Fmin tract sherds
073	Hill top	FN-EB I: x EB II+: x FMin: 3	FN-EB I: x EB II+: x FMin: 29	Ch: 2/0 (1 EBA) G: None	FN-EB I: - EB II+: - FMin: 0.36-0.48	FN-EB I: - EB II+: - FMin: 0.2	FN-EB I: - EB II+: - FMin: settlement	FN-EBA study; limited background information available; substantial FMin scatter, mainly on hill crest, though also eroding down the slope; denser hill crest scatter used to suggest site size; related Fmin tract sherds
074	Terraces	FN-EB I: x EB II+: 2 FMin: 2	FN-EB I: x EB II+: 6+ FMin: 2+	Ch: 6/4 (obs: 4 EBA) G: None	FN-EB I: - EB II+: 0.16-0.46 FMin: 0.04-0.12	FN-EB I: - EB II+: 0.46? FMin: ?	FN-EB I: - EB II+: settlement? FMin: ?	FN-EBA study; visibility poor in some areas; overall site edges hard to define; prob. partly disturbed by later occupation and recent land use; scatter concentrates on fairly gentle crest; obs. in similar areas; no real spatial resolution available to suggest FMin site size
075	Terraces	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: (1) FMin: x	Ch: None G: 1	-	-	-	FN-EBA study; in vicinity of site 067

Table 4.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
076	Cave/ flat area	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: no info. FMin: x	Ch: None G: None	-	-	-	Overview; overall site integrity is quite good
077	Ridge/ knoll/ terraces	FN-EB I: 2 EB II+: (1) FMin: x	FN-EB I: 10+ EB II+: 2 FMin: x	Ch: 3/2 (obs: 1 EBA) G: None	FN-EB I: n/a-no info. EB II+: - FMin: -	FN-EB I: not possible EB II+: - FMin: -	FN-EB I: ? EB II+: - FMin: -	Minitracts-prelim. study; FN-EBA material concentrated within enclosures on top of knoll; obvious grazing area; related FN-EB I tract sherds
078	Field	FN-EB I: ? EB II+: 2 FMin: 2	FN-EB I: no info. EB II+: no info. FMin: no info.	Ch: None G: None	FN-EB I: - EB II+: no info. FMin: no info.	FN-EB I: - EB II+: not possible FMin: not possible	FN-EB I: - EB II+: ? FMin: ?	Prelim. study; area in parts disturbed and in parts covered by vegetation; edges not clearly defined; main overall concentration in ploughed olive grove; no available information on FN-EBA scatters specifically; related FMin tract sherds
079	Fields	FN-EB I: x EB II+: ? FMin: 2	FN-EB I: x EB II+: no info. FMin: no info.	Ch: None G: None	FN-EB I: - EB II+: - FMin: no info.	FN-EB I: - EB II+: - FMin: not possible	FN-EB I: - EB II+: - FMin: ?	Prelim. study; limited information available, none of which relates to FN-EBA spatial resolution; site disturbed by bulldozing; major concentration of sherds (all phases) in rock pile; material also rolling down slope to the N
081	Terraces	FN-EB I: x EB II+: ? FMin: 2	FN-EB I: x EB II+: no info. FMin: no info.	Ch: 2/0 (EBA) G: None	FN-EB I: - EB II+: - FMin: n/a-no info.	FN-EB I: - EB II+: - FMin: not possible	FN-EB I: - EB II+: - FMin: ?	Minitracts/grabs-Prelim. study; no further information available
082	Plateau edge/ terraces	FN-EB I: x EB II+: x FMin: 3	FN-EB I: x EB II+: x FMin: no info.	Ch: 7/114 (obs: 2(1) Neo) G: 2	FN-EB I: - EB II+: - FMin: no info.	FN-EB I: - EB II+: - FMin: not possible	FN-EB I: - EB II+: - FMin: ?	Prelim. study; FMin material concentrated in central area, particularly along N-S axis; related FMin tract sherds; no further information available
084*	Small shallow gully	FN-EB I: x EB II+: 3 FMin: x	FN-EB I: x EB II+: no info. FMin: x	Ch: 3/0 (1 EBA) G: None	FN-EB I: - EB II+: n/a-0.2 FMin: -	FN-EB I: - EB II+: 0.2? FMin: -	FN-EB I: - EB II+: settlement FMin: -	Grab; v. abraded material; small sparse sherd scatter; obs. scatter extends further; area disturbed by airport construction; shallow gully is alluviated; related EB II+ tract sherds; further EB II+ tract sherds identified around the S edge of the airport and on site 149 definitely indicate the presence of a site, even if exact location is not clear
085a*	Base of knoll	FN-EB I: 3 EB II+: 3 FMin: x	FN-EB I: 1+ EB II+: 8(2) FMin: x	Ch: 22/192 (obs: 6(1) EBA; 1(2) FN) G: None	FN-EB I: 0.01-no spatial resolution EB II+: 0.03-0.07 FMin: -	FN-EB I: not possible EB II+: 0.07 FMin: -	FN-EB I: settlement EB II+: settlement FMin: -	V. abraded material; located just below knoll to the N; material in SE area is probably eroding from actual site and pos. even site 085C which shares the same drainage system; sherds and lithics are in similar areas; related FN-EB I and EB II+ tract sherds

Table 4.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
085b*	Wall enclosed field	FN-EB I: x EB II+: 3 FMin: x	FN-EB I: x EB II+: 7(2) FMin: x	Ch: 37/540 (obs: 5(3)EBA; (3) FN) G: None	FN-EB I: - EB II+: 0.023-0.225 FMin: -	FN-EB I: - EB II+: 0.11 FMin: -	FN-EB I: - EB II+: settlement FMin: -	V. abraded material; retained by field enclosure on E slope of low rise; sherd concentration limited compared to (possibly FN-EBA) lithic assemblage, though in similar areas; material in lower section of site may be erosion from 085B, or even from 085A/C; related EB II+ tract sherds
085c*	Small plateau/ slopes	FN-EB I: 2 EB II+: 3 FMin: x	FN-EB I: 1+ EB II+: 47(16) FMin: x	Ch: 51/69 (obs: 17EBA; 3(5) FN; 1(1) FNEBA) G: 1	FN-EB I: 0.02-no spatial resolution EB II+: 0.48-1.57 FMin: -	FN-EB I: not possible EB II+: 0.6 FMin: -	FN-EB I: lithics production? EB II+: settlement FMin: -	V. abraded sherds (quite large in places); material on plateau well defined, but not below escarpment (eroding); apparent lack FN-EBA sherds on plateau edge linking the two concentrations proved false during revisitation; related EB II+ tract sherds; see main text for further details (chapter 4, section 4.4.3)
085d	Small plateau/ steep slopes	FN-EB I: (1) EB II+: x FMin: x	FN-EB I: 1 EB II+: x FMin: x	Ch: 0/39 (oth: 1 EBA) G: None	-	-	-	In the vicinity of site 004 (200m down slope)
088	Plateau edge	FN-EB I: 1 EB II+: 2 FMin: x	FN-EB I: 2+ EB II+: several FMin: x	Ch: 28/303 (obs: 2(2) EBA; (3) FN; oth: 2 EBA) G: None	FN-EB I: 0.01-no spatial resolution EB II+: no info. FMin: -	FN-EB I: not possible EB II+: not possible FMin: -	FN-EB I: settlement? EB II+: settlement? FMin: -	Prelim. study; on plateau edge above cliff; prob. localised erosion in places; FN-EB I sherds and chipped stone are located in similar area near cliff edge; no EB II+ spatial resolution available
089	Road section	FN-EB I: 2 EB II+: x FMin: x	FN-EB I: several EB II+: x FMin: x	Ch: None G: None	FN-EB I: n/a EB II+: - FMin: -	FN-EB I: not possible EB II+: - FMin: -	FN-EB I: ? EB II+: - FMin: -	Grab-Prelim. study; few well-preserved FN-EB I sherds in section, clearly not *in situ* (stratified above classical sherds); could have rolled down steep slopes of a ridge 350m SW; a single FN-EB I definite sherd is the only FN-EBA tract material recovered from the partially tractwalked ridge, though the area has suffered from recent land use
090	Fields	FN-EB I: x EB II+: 3 FMin: x	FN-EB I: x EB II+: 41 FMin: x	Ch: 7/0 (2 EBA) G: 2	FN-EB I: - EB II+: 0.09-0.62 FMin: -	FN-EB I: - EB II+: 0.22 FMin: -	FN-EB I: - EB II+: settlement FMin: -	FN-EBA study; sherds retained in clusters by field walls; dense scatter on small plateau; material on slopes above may originate from another unidentified site up-hill or off-transect; area of modern field house prob. also part of site; construction is likely to have brought more material to the surface; several related EB II+ tract sherds
091	Slopes/ some terraced	FN-EB I: 2 EB II+: 2 FMin: 1	FN-EB I: no info. EB II+: no info. FMin: no info.	Ch: 0/4 G: None	FN-EB I: no info. EB II+: no info. FMin: no info.	FN-EB I: not possible EB II+: not possible FMin: not possible	FN-EB I: ? EB II+: ? FMin: ?	Prelim. study; recent land use; poor visibility because of heavy vegetation; small and v. abraded material; no further information available
092	Hill/ terraces	FN-EB I: ? EB II+: ? FMin: ?	FN-EB I: no info. EB II+: (27) FMin: (23)	Ch: 8/12 (obs: 2 EBA; (2) Neo) G: 4	-	-	-	Rather poor overall site integrity; heavy land use; material very abraded; may have also been disturbed by later occupation; possible FN-EBA site

Table 4.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Adjacent grid squares-total scatter (ha) comp 1-3 only	Suggested size (ha) comp 1-3 only	Site function comp 1-3 only	Comments
093	Broad rise/ terraced fields	FN-EB I: (1) EB II+: 1 FMin: 2	FN-EB I: 1 EB II+: 7+ FMin: 17+	Ch: 7/1 (obs: 3 EBA) G: 4	FN-EB I: - EB II+: 0.06-0.06 FMin: 0.08-2.6	FN-EB I: - EB II+: 0.32 FMin: 0.73	FN-EB I: - EB II+: settlement? FMin: settlement	FN-EBA study; EBII+ material concentrated mainly in NE part of grid and possibly rolling down slope; FN-EBA site disturbed by later occupation and recent land use; discrete sherd concentration in extension to E seems to be part of site 060 and were not included in the suggested site size; related FMin tract sherds
094	Terraces	FN-EB I: x EB II+: ? FMin: x	FN-EB I: x EB II+: no info. FMin: x	Ch: None G: None	-	-	-	Overview; at base of steep slopes below Palaiokastro near survey boundary
097	Narrow ridge	FN-EB I: (1) EB II+: 2 FMin: 2	FN-EB I: 1 EB II+: 2+ FMin: 5+	Ch: 1/0 (EBA) G: None	FN-EB I: - EB II+: 0.04-0.45 FMin: 0.08-0.6	FN-EB I: - EB II+: 0.08?? FMin: 0.2?	FN-EB I: - EB II+: settlement? FMin: settlement?	FN-EBA study; material appears to be rolling down ridge slope; no detailed information on FN-EBA material; site sizes are tentative, based on the assumption that the main concentration would have been on the top of the ridge; related EB II+ tract sherds
098	Fields/ terraces	EBA: (1)	EBA: None	Ch: 1/0 (EBA) G: None	-	-	-	Overview; just below long ridge that leads to Kastri; FN-EBA activity throughout this area
100	Terrace	FN-EB I: x EB II+: ? FMin: 3	FN-EB I: x EB II+: no info. FMin: 7(16)	Ch: 0/1 G: None	FN-EB I: - EB II+: - FMin: 0.03-0.045	FN-EB I: - EB II+: - FMin: 0.055	FN-EB I: - EB II+: - FMin: settlement	Much of site has been disturbed by bulldozing; this may explain the variation in sherd abrasion across the site; prob. a late EB III settlement; suggested site size includes part of the bulldozed area
101*	Low hill	FN-EB I: 2 EB II+: 1 FMin: 3	FN-EB I: 2+ EB II+: 4 FMin: 32(7)	Ch: None G: 1	FN-EB I: 0.005-0.008 EB II+: 0.01-0.07 FMin: 0.03-0.035	FN-EB I: ? EB II+: ? FMin: 0.035?	FN-EB I: settlement? EB II+: settlement? FMin: settlement? burial?	Overall poor site integrity, good visibility; seriously disturbed by bulldozing, quarrying and cultivation; lithics and sherds not in same areas; FN-EB I sherd counts low, but cannot be from anywhere else; EB II+ spatial resolution very poor; FMin sherds in vicinity of a soil heap so spatial resolution also questionable; related FMin tract sherds
102	Fields in vicinity of rock shelter	FN-EB I: x EB II+: x FMin: 3	FN-EB I: x EB II+: x FMin: 22(3)	Ch: None G: None	FN-EB I: - EB II+: - FMin: 0.04-0.06	FN-EB I: - EB II+: - FMin: 0.025?	FN-EB I: - EB II+: - FMin: settlement	Concentration mainly in front of cave; varied abrasion, Fmin best preserved; scatter may be associated with the excavation of well; FMin could be late EB III; related FMin tract sherds
105	Ridge/ slopes	FN-EB I: 2 EB II+: x FMin: x	FN-EB I: 1+ EB II+: x FMin: x	Ch: 0/1 G: 1	FN-EB I: no spatial resolution EB II+: - FMin: -	FN-EB I: not possible EB II+: - FMin: -	FN-EB I: settlement? EB II+: - FMin: -	One chert sherd in grid, less abraded than other material; further chert in nearby field suggesting the presence of an FN-EB I site; no further information available on spatial resolution

Table 4.1 continued

SITES	FN-EB I	EB II+	FMin	FN-EBA	Comments
001c	x	2 sherds/obsidian	? sherds/obsidian	-	
003	x	3 sherds/obsidian	x	-	
004	3 sherds/obsidian	3 sherds/obsidian	3 sherds/obsidian	-	
006	x	3 sherds/chert	x	-	
008	2 sherds/obsidian	3 sherds/obsidian	(1) sherds/obsidian	-	
011	x	? sherds	x	-	
013	x	2 sherds	2	-	
016	x	? sherds	x	-	
017	x	? sherds	x	-	
019	2 sherds	2 sherds	x	-	
020	2 sherds	2 sherds	? sherds	-	
023	1L obsidian	3L obsidian	x	-	
024	x	(1) sherds	x	-	
025	x	x	? sherds	-	
027	x	x	? sherds	-	
029	(1) sherds/obsidian	3 sherds/obsidian	x	-	
030	x	? sherds	x	-	
031	x	? sherds	x	-	
032	x	2 sherds/obsidian	2 sherds/obsidian	-	
033	x	(1) sherds	x	-	
037	2 sherds/obsidian	2 sherds/obsidian	x	-	
038	? sherds	? sherds	x	-	
041-42	-	-	-	? obsidian	
047	1L obsidian	1L obsidian	x	-	
049	x	2 sherds	x	-	
051	x	2 sherds	x	-	
054	x	x	(1) sherds	-	
055	x	? sherds/obsidian	x	-	
056	? sherds	? sherds	x	-	
057	x	2 sherds	(1) sherds	-	
060	x	x	1 sherds	-	
064	2 sherds/obsidian	3 sherds/obsidian	3 sherds/obsidian	-	
067	x	2 sherds/obsidian	? sherds/obsidian	-	
068	1 sherds	2 sherds	2 sherds	-	
069	x	1 sherds/obsidian	1 sherds/obsidian	-	
071	? sherds	x	? sherds	-	
072	x	2 sherds/obsidian	2 sherds/obsidian	-	
073	x	x	3 sherds/obsidian	-	
074	x	2 sherds/obsidian	2 sherds/obsidian	-	
075	x	? sherds	x	-	
076	x	? sherds	x	-	
077	2 sherds/obsidian	(1) sherds/obsidian	x	-	
078	? sherds	2 sherds	2 sherds	-	
079	x	? sherds	2 sherds	-	
081	x	? sherds/obsidian	2 sherds/obsidian	-	
082	x	x	3 sherds/obsidian	-	
084	x	3 sherds/obsidian	x	-	

Table 4.2: Sites with FN-EBA pottery and/or lithics on Kythera (Components: ? only possible material; (1) insignificant; 1 small; 2 minor; 3 major – L: Dating based on chipped stone only)

SITES	FN-EB I	EB II+	FMin	FN-EBA	Comments
085a	3 sherds/obsidian	3 sherds/obsidian	x	-	
085b	x	3 sherds/obsidian	x	-	
085c	2 sherds/obsidian	3 sherds/obsidian	x	-	
085d	(1) sherds/obsidian	x	x	-	
088	1 sherds/obsidian	2 sherds/obsidian	x	-	
089	2 sherds	x	x	-	
090	x	3 sherds/obsidian	x	-	
091	2 sherds	2 sherds	1 sherds	-	
092	? sherds/obsidian	? sherds/obsidian	? sherds/obsidian	-	
093	(1) sherds/obsidian	1 sherds/obsidian	2 sherds/obsidian	-	
094	x	? sherds	x	-	
097	(1) sherds/obsidian	2 sherds/obsidian	2 sherds/obsidian	-	
098	-	-	-	(1) obsidian	
100	x	? sherds	3 sherds	-	
101	2 sherds	1 sherds	3 sherds	-	
102	x	x	3 sherds	-	
105	2 sherds	x	x	-	
106	? obsidian	x	x	-	
108	2 sherds/obsidian	2 sherds	? sherds	-	
109	(1) sherds	2 sherds	(1) sherds	-	
110	? sherds	x	2 sherds	-	
111	x	x	1 sherds	-	
112	x	2 sherds/obsidian	2 sherds/obsidian	-	
113	x	x	? sherds	-	
114	x	? sherds/obsidian	1 sherds/obsidian	-	
116	x	? sherds/obsidian	1 sherds/obsidian	-	
117	? sherds	x	1 sherds/obsidian	-	
118	? sherds/obsidian	1 sherds/obsidian	3 sherds/obsidian	-	
121	(1) sherds/obsidian	2 sherds/obsidian	2 sherds/obsidian	-	
123	2 sherds	? sherds	x	-	
124	? sherds/obsidian	3 sherds/obsidian	2 sherds/obsidian	-	
125	2 sherds	3 sherds	x	-	
129	x	x	1 sherds	-	
130	x	x	(1) sherds	-	
131	x	? sherds	x	-	
132	x	? sherds	x	-	
134	2 sherds/obsidian	2 sherds/obsidian	x	-	
135	x	? sherds	x	-	
136	2 sherds/obsidian	3 sherds/obsidian	3 sherds/obsidian	-	
137	x	? sherds/chert	x	-	
138	2 sherds	x	x	-	
139	(1) sherds/obsidian	3 sherds/obsidian	1 sherds/obsidian	-	
141	x	x	? sherds	-	
142	x	(1) sherds	? sherds	-	
144	x	x	3 sherds	-	
146	2 sherds/obsidian	? sherds/obsidian	2 sherds/obsidian	-	
147	?L obsidian	x	x	-	

Table 4.2 continued

SITES	FN-EB I	EB II+	FMin	FN-EBA	Comments
149	x	(1) sherds	(1) sherds	-	
150	x	? sherds	x	-	
152	x	? sherds/obsidian	1 sherds/obsidian	-	
153	(1) sherds	1 sherds	x	-	
154	x	? sherds	x	-	
156	? sherds/obsidian	3 sherds/obsidian	x	-	
157	x	2 sherds	x	-	
158	? sherds	? sherds	x	-	
159	? sherds/obsidian	? sherds/obsidian	x	-	
161	x	2 sherds/obsidian	x	-	
164	2 sherds/obsidian	3 sherds/obsidian	2 sherds/obsidian	-	
166	(1) sherds/obsidian	3 sherds/obsidian	x	-	Part of 164?
168	-	-	-	? obsidian	
172	x	? sherds	x	-	
174	2 sherds/obsidian	? sherds	x	-	
180	? sherds	x	x	-	
184	?L sherds/obsidian	?L sherds/obsidian	x	-	
186	3 sherds	x	x	-	

Table 4.2 continued

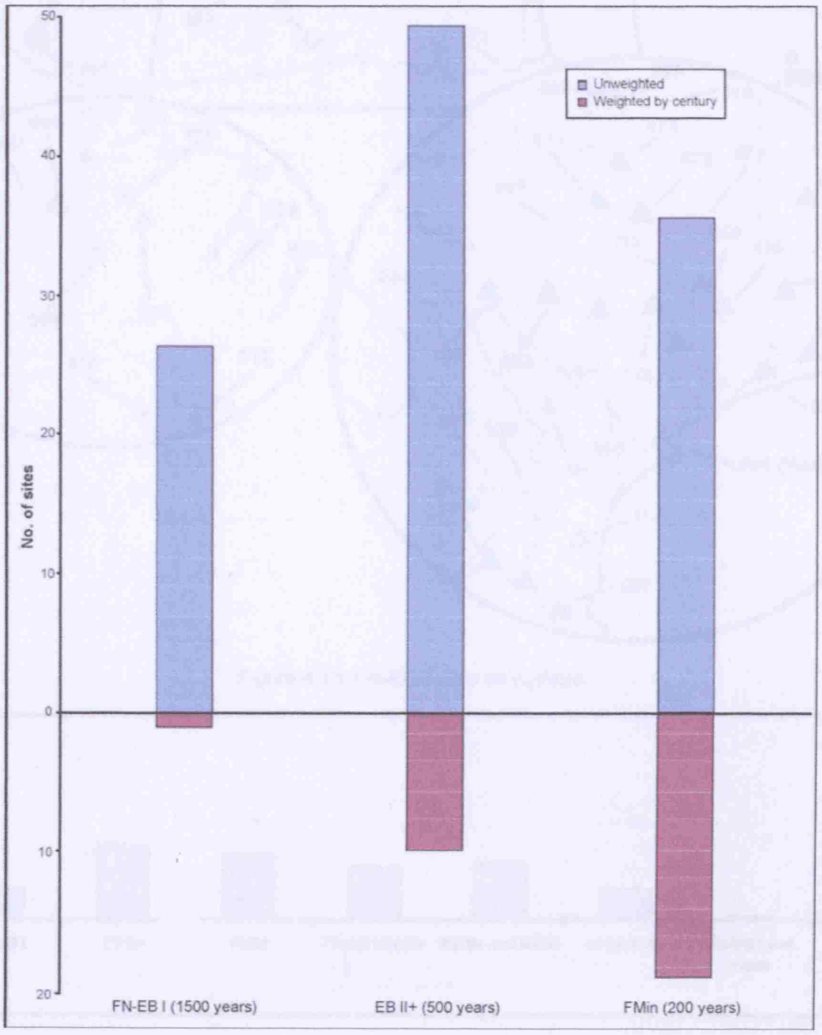


Figure 4.12: Number of sites within each FN-EBA phase

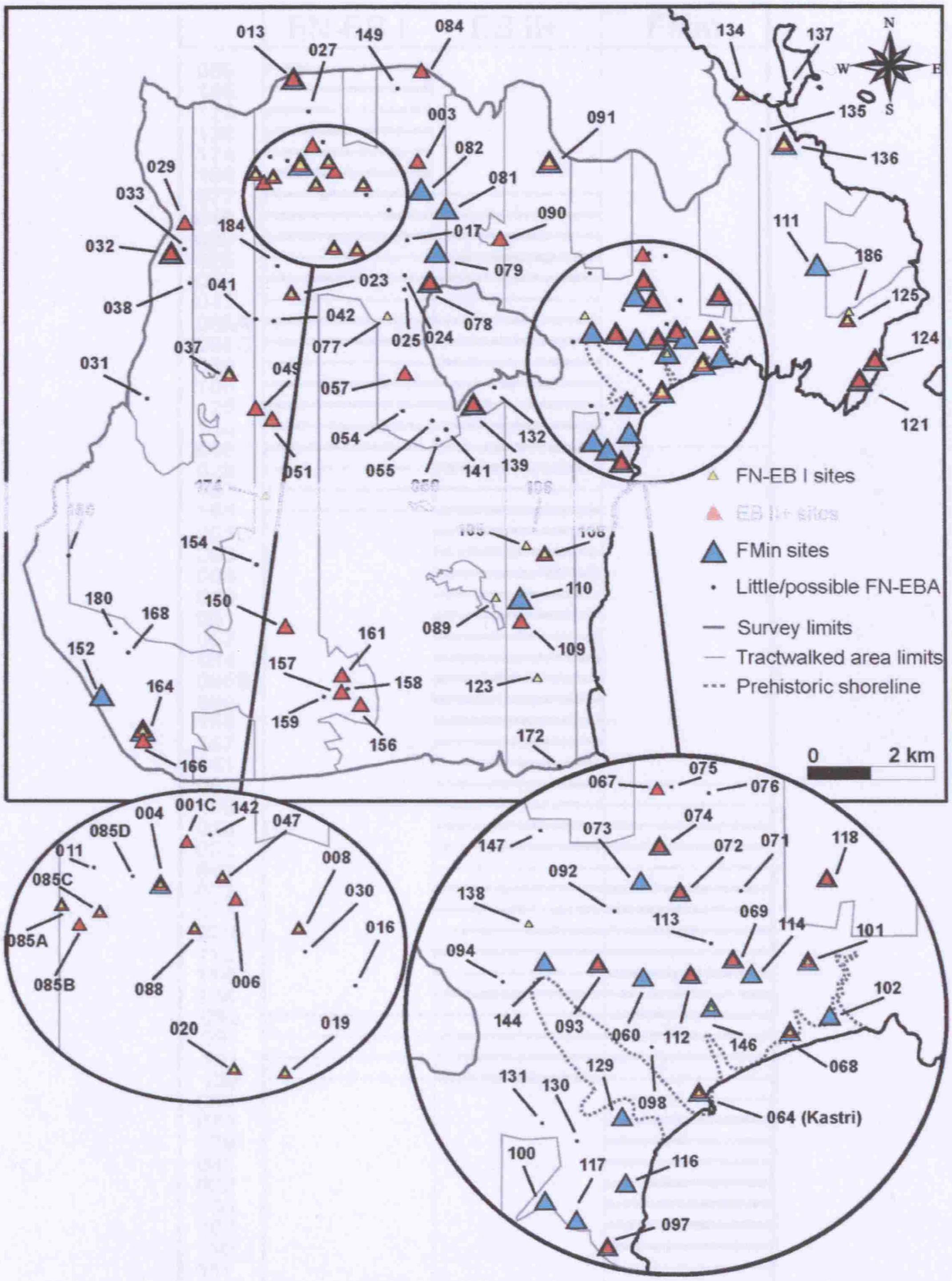


Figure 4.13: FN-EBA sites on Kythera

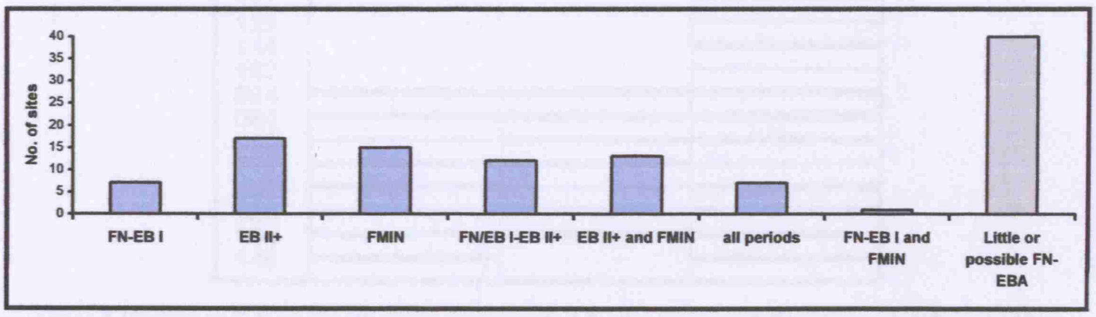


Figure 4.14: Sites on Kythera grouped according to the number of FN-EBA phases they cover

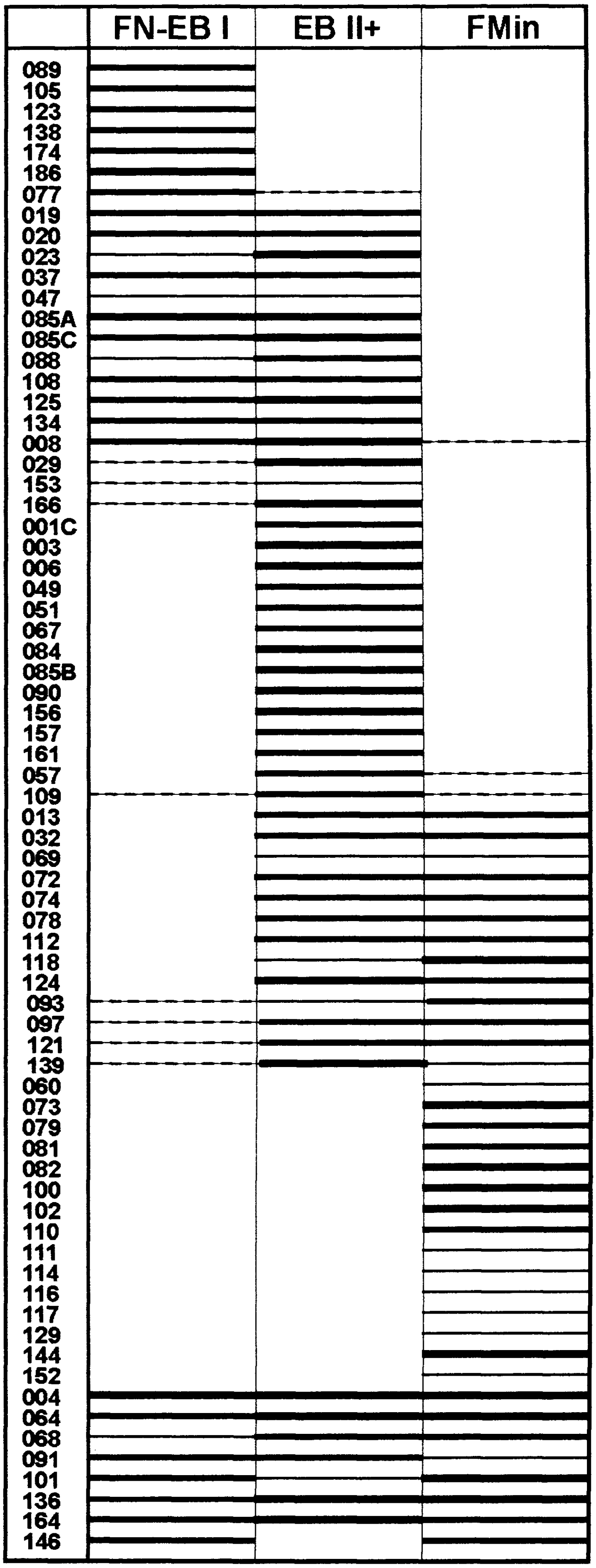


Figure 4.15: Sites on Kythera in each phase (components 1-3 – line thickness indicates component; dashed line indicates insignificant material)

SITES	FN-EB I	EB II+	FMin
001c	-	0.23	-
003	-	0.7	-
004	0.065	0.12	0.025
006	-	0.06	-
008	0.04	0.16	-
013	-	?	?
019	?	?	-
020	?	?	-
023	?	?	-
029	-	0.21	-
032	-	0.07	?
037	?	0.08	-
047	?	?	-
049	-	0.1	-
051	-	?	-
057	-	?	-
060	-	-	0.2
064	1.7	4.5	4.9
067	-	0.15	-
068	?	0.08	0.1
069	-	?	?
072	-	1.01	0.28
073	-	-	0.2
074	-	0.46	?
077	?	-	-
078	?	?	?
079	-	-	?
081	-	-	?
082	-	-	?
084	-	0.2	-
085a	?	0.07	-
085b	-	0.11	-
085c	?	0.6	-
088	?	?	-
089	?	-	-
090	-	0.22	-
091	?	?	?
093	-	0.32	0.73
097	-	0.08	0.2
100	-	-	0.055
101	?	?	0.035
102	-	-	0.025
105	?	-	-
108	?	?	-
109	-	0.2	-
110	-	-	0.39
111	-	-	?
112	-	0.12	?
114	-	-	?
116	-	-	?
117	-	-	?
118	-	?	0.21
121	-	?	?
123	0.065	-	-
124	-	?	?
125	0.2	0.2	-
129	-	-	?
134	?	0.07	-
136	?	?	?
138	?	-	-
139	-	0.15	?
144	-	-	?
146	?	-	?
152	-	-	?
153	-	?	-
156	-	0.87	-
157	-	?	-
161	-	?	-
164	0.07	0.26	0.08
166	-	0.16	-
174	0.1	-	-
186	0.04	-	-

Table 4.3: Site size for each FN-EBA phase
(components 1-3)

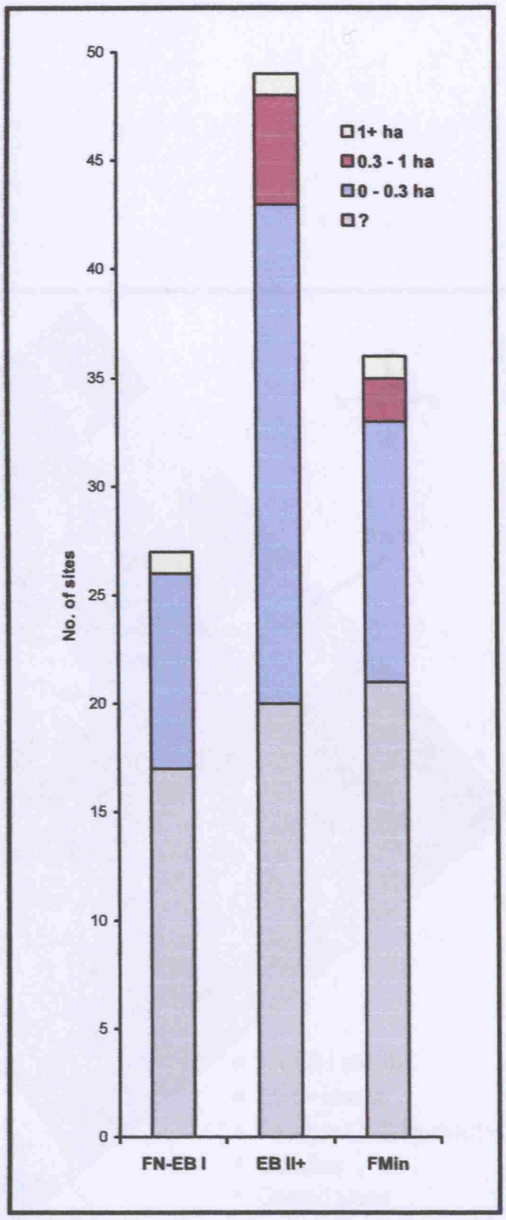


Figure 4.16: Site size for each FN-EBA phase
(components 1-3)

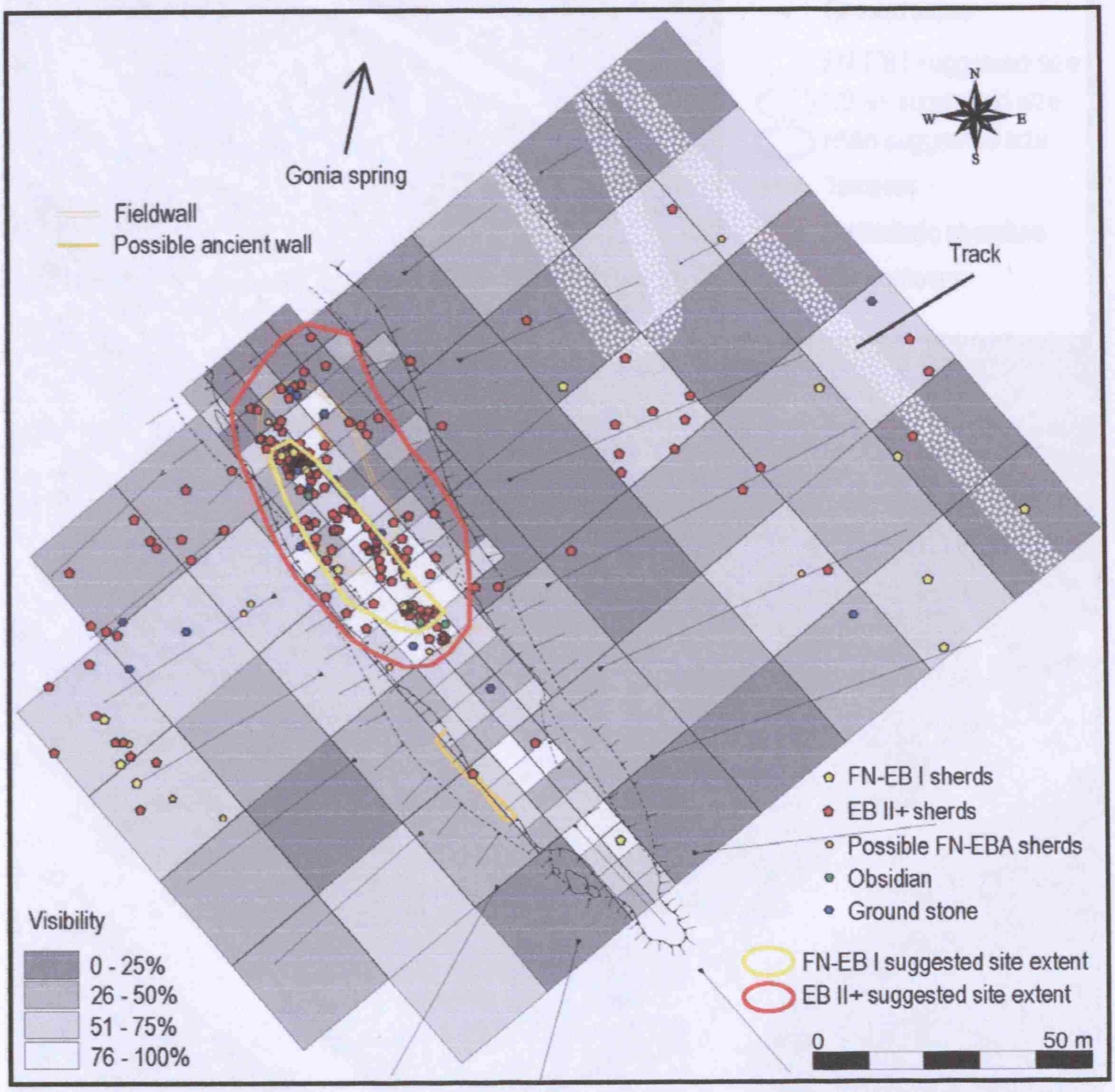


Figure 4.17: Site 008

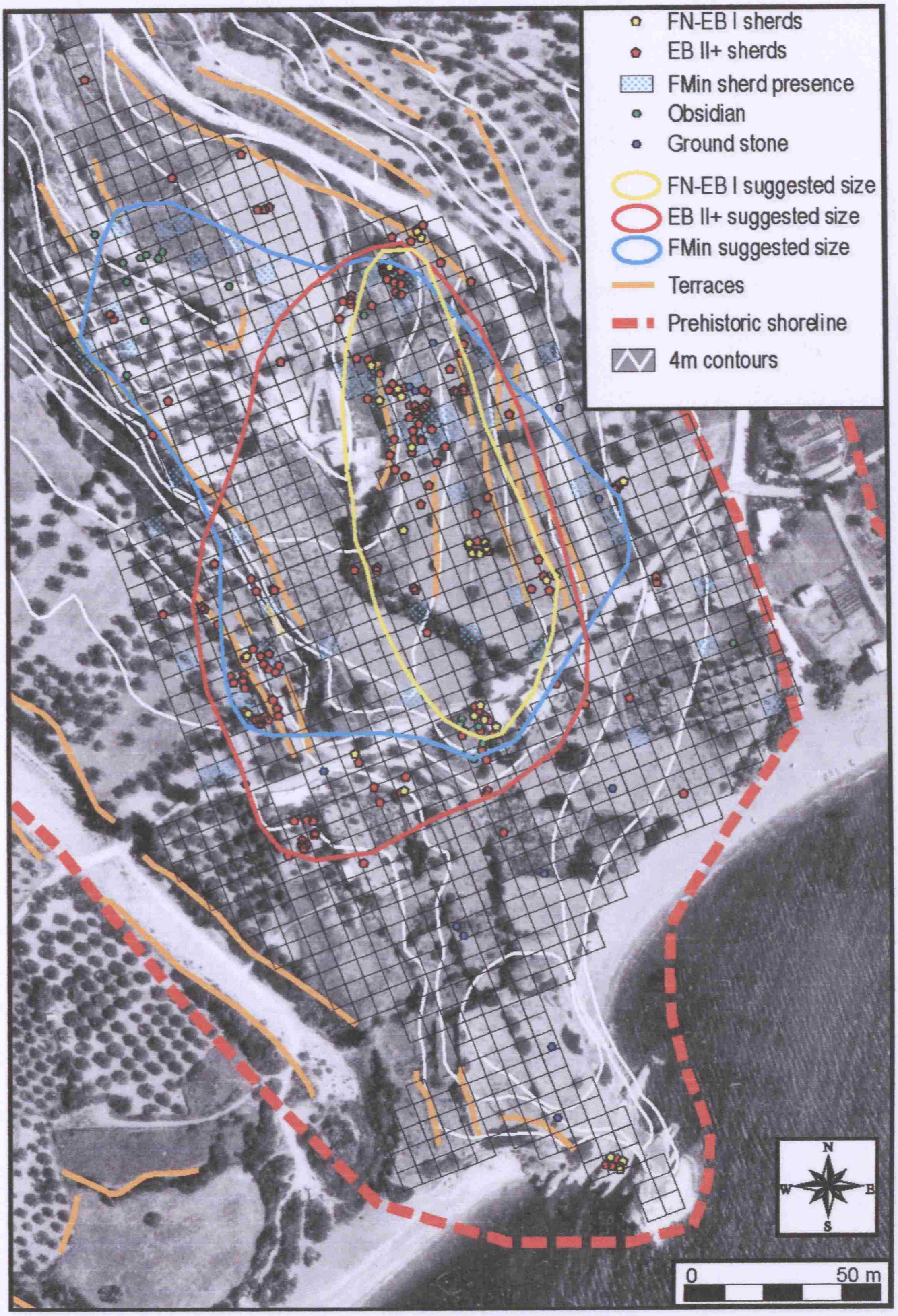


Figure 4.18: Site 064 - Kastri

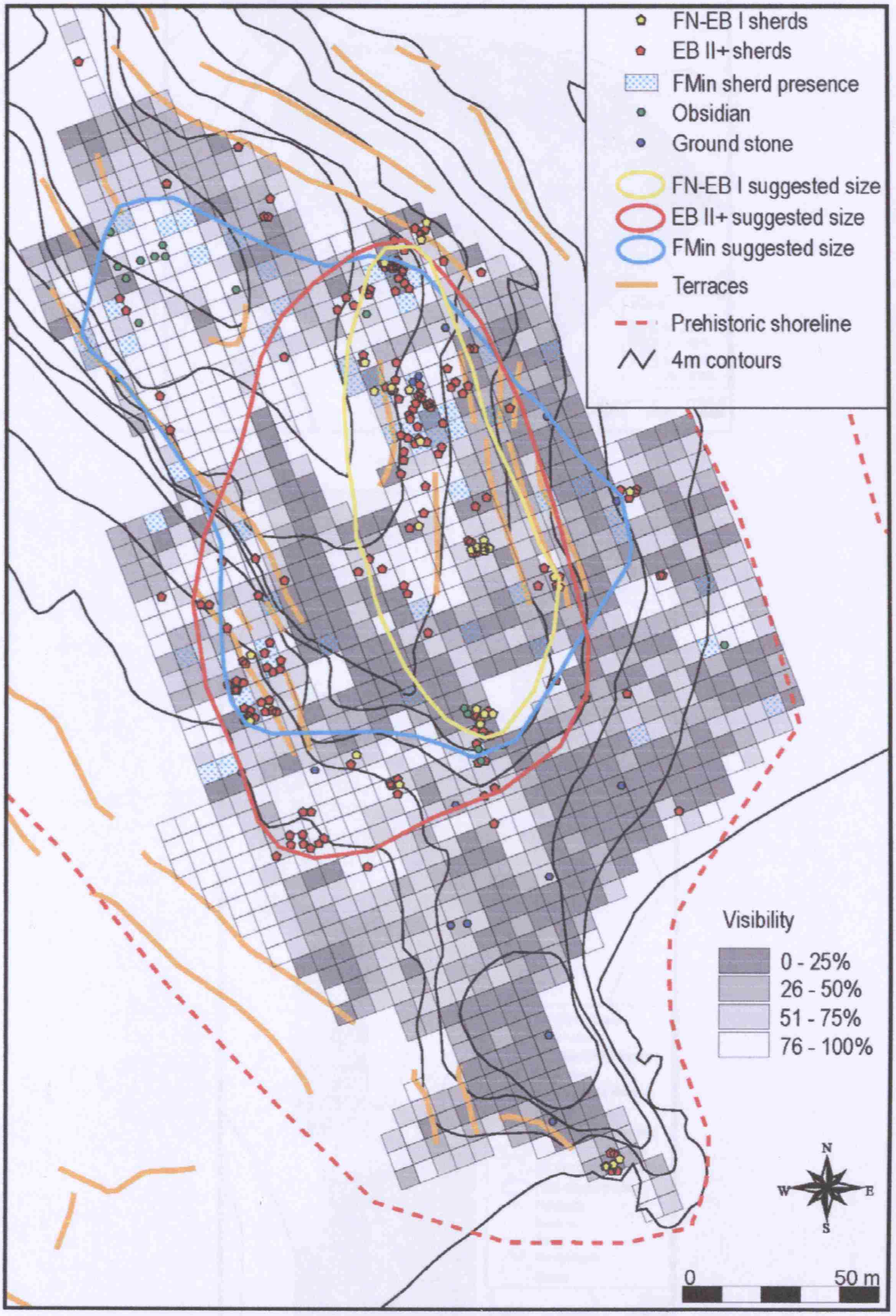


Figure 4.19: Site 064 - Kastri

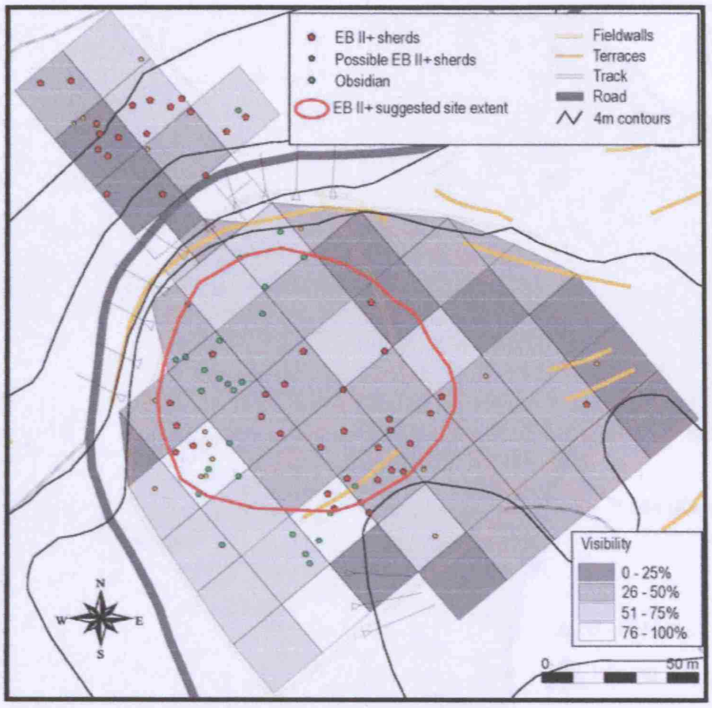


Figure 4.20: Site 085c

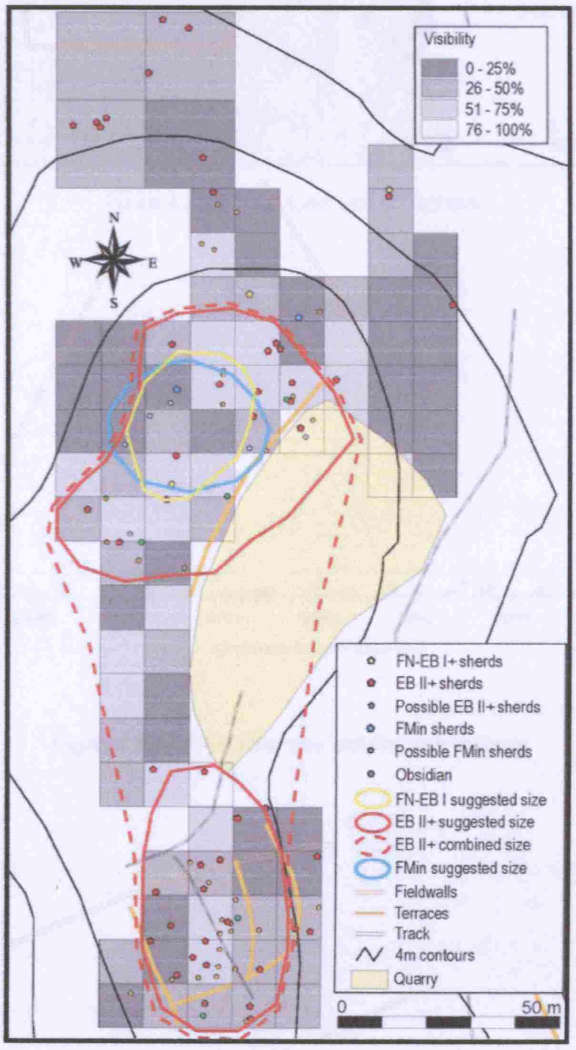


Figure 4.21: Site 164-166

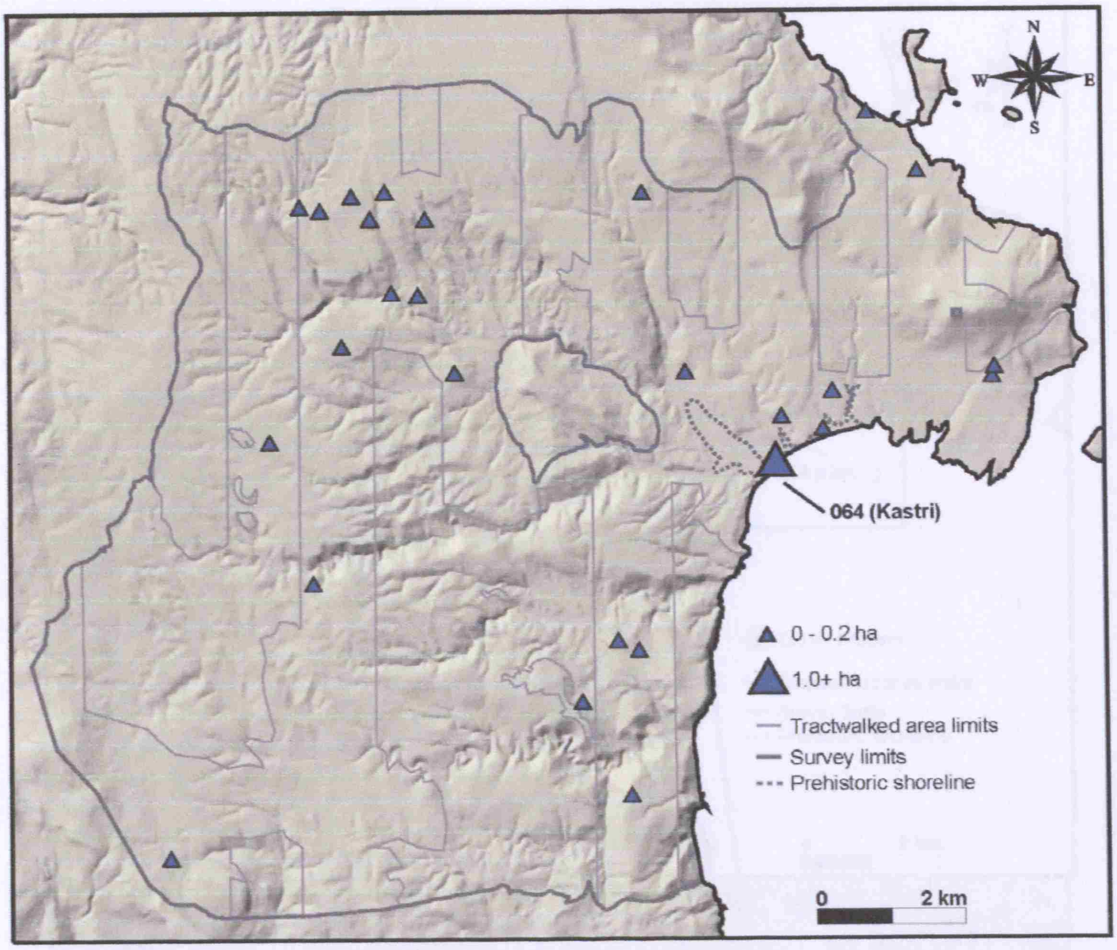


Figure 4.22: FN-EB I site size on Kythera

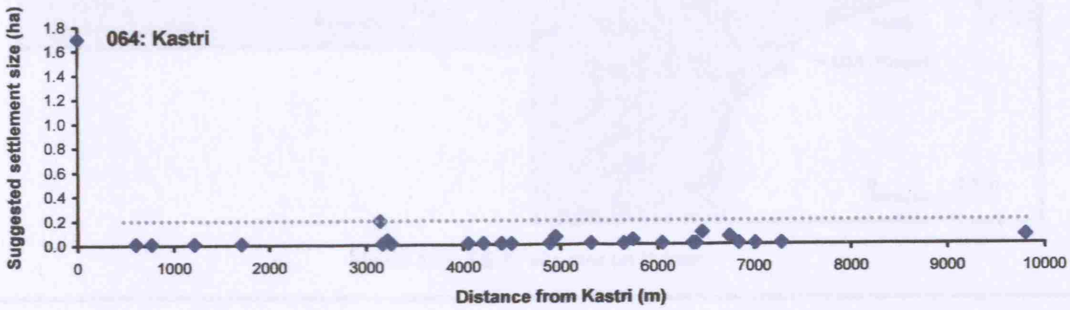


Figure 4.23: FN-EB I site size and distance to Kastri

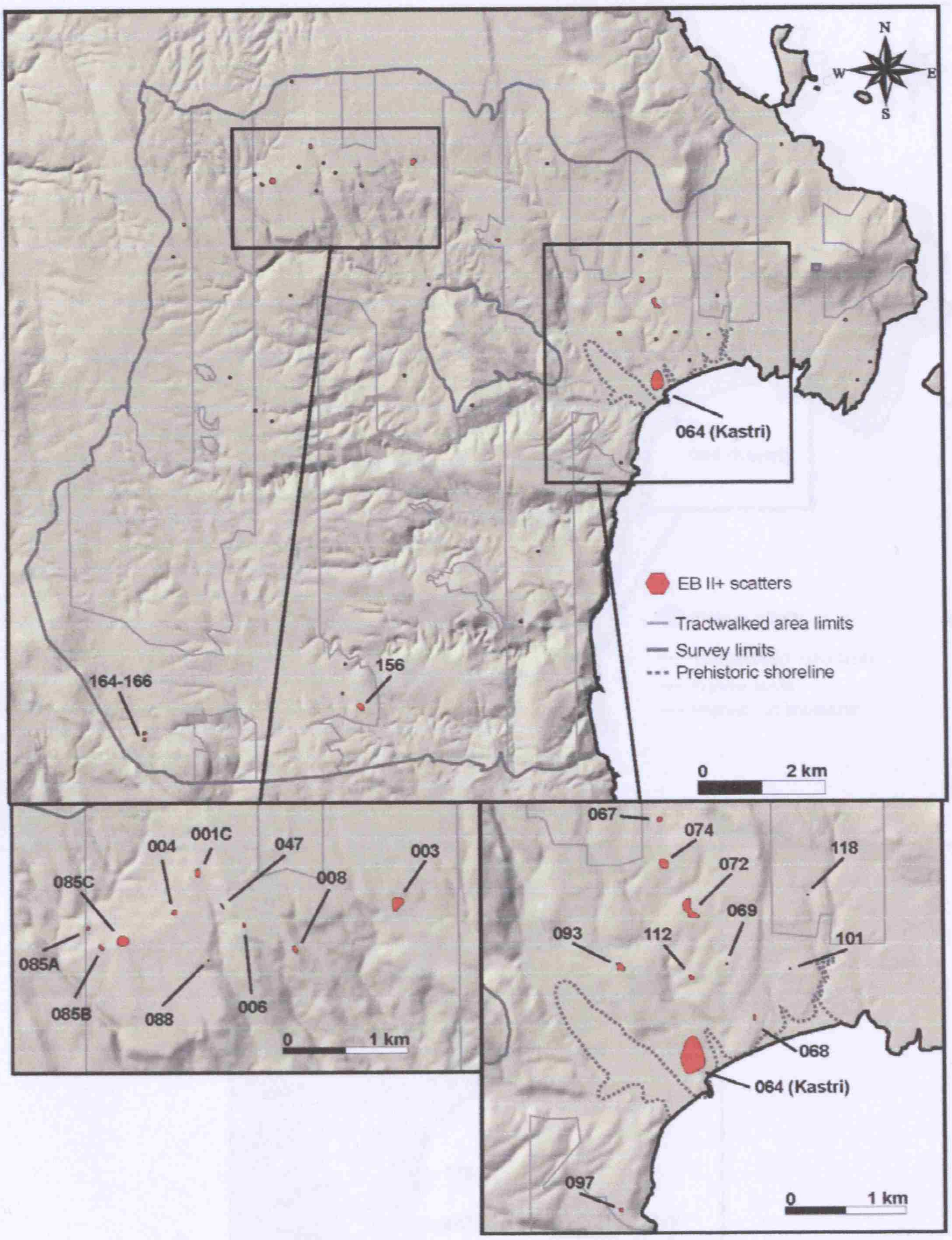


Figure 4.24: EB II+ site size on Kythera

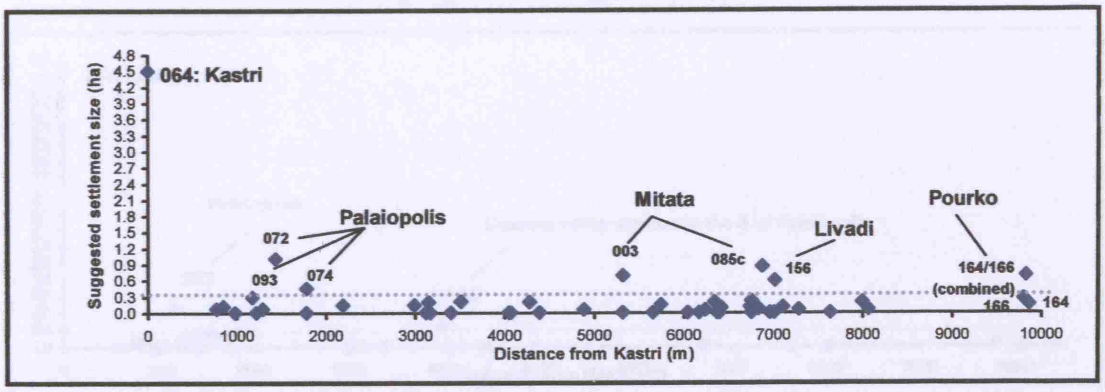


Figure 4.25: EB II+ site size and distance to Kastri

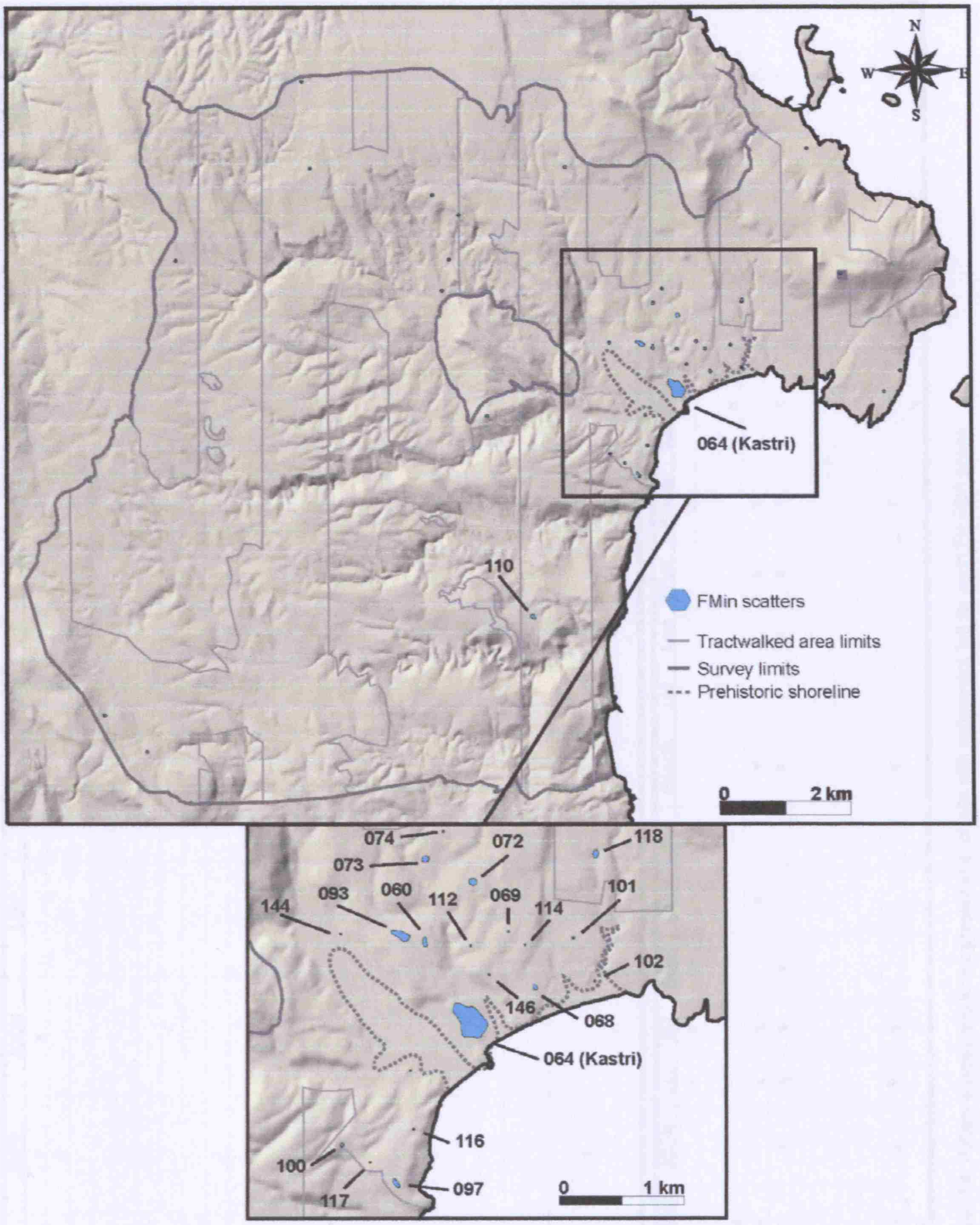


Figure 4.26: FMin site size on Kythera

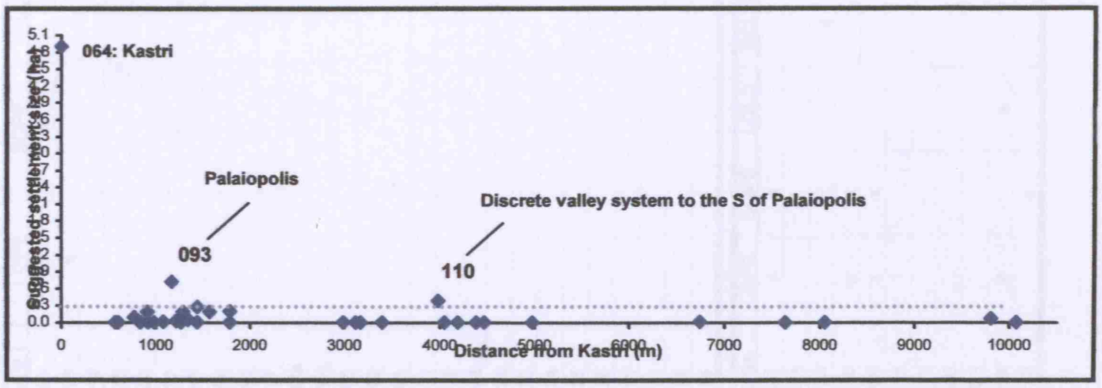


Figure 4.27: FMin site size and distance to Kastri

FN-EB I	LOPE	SOPE	LCLO	JOPE	JCON	LU	SU	Bowl	Lid	Lug	Pyxis	Obsidian	Groundstone
004	x	x		x	x			x		x	(x)	x	
008	x		x	x		x	x	(x)				x	
019													x
020													
023												x	
037												x	
047												x	x
064												x	x
068												x	
077												x	
085a						x						x	
085c						x						x	x
088												x	
089													
091													
101					x					x			x
105													x
108												x	
123													
125													
134						x				x		x	
136												x	
138												x	
146												x	
164				x		x		x				x	
174												x	
186													

EB II+	LOPE	SOPE	LCLO	SCLO	JOPE	JCON	LU	SU	Bowl	CPot	Cup	Hearth	Lid	Lug	Pan	Pithos	Sauceboat	Saucer	Obsidian	Groundstone
001	x	x					x	x	(x)		(x)					(x)			x	x
003																			x	x
004		x		x	x												x		x	
006	x	x			x		x	x		x		x			x	x				x
008	x	x			x	x	x	x	x			x	x	x	x	x	x		x	x
013																				
019																				x
020																				
023																			x	
029	x		x		x	x	x	x				x				x			x	x
032		x			x												x		x	

Table 4.4: Pottery shapes and lithics present at each site with component 1-3 for each FN-EBA phase

EB II+	LOPE	SOPE	LCLO	SCLO	JOPE	JCON	LU	SU	Bowl	CPot	Cup	Hearth	Lid	Lug	Pan	Pithos	Sauceboat	Saucer	Obsidian	Groundstone
037	x				x		x		(x)						(x)				x	
047																			x	x
049																				
051																				
057																				
064																			x	x
067																			x	
068																			x	
069																			x	
072																			x	
074																			x	
078																				
084																			x	
085a	x				x										x				x	
085b	x	x			x	x		x							x			x	x	
085c	x	x			x	x	x											x	x	x
088																			x	
090																			x	x
091																				
093																			x	x
097																			x	
101	x					x														x
108																			x	
109																				
112																			x	
118																			x	
121																			x	x
124																			x	
125																				
134					x														x	
136																			x	
139																			x	
153																				x
156																			x	x
157																				x
161																			x	
164	x				x	x		x	x					x	x		(x)	x	x	
166	x	x			x			x				x					(x)		x	

Table 4.4: continued

FMin	LOPE	SOPE	LCLO	JOPE	JCON	LU	SU	Basin	Bowl	Goblet	Lid	Pan	Pithos	Obsidian	Groundstone
004	x			x					x					x	
013															
032														x	
060															x
064														x	x
068														x	
069														x	
072														x	
073														x	
074														x	
078															
079															
081														x	
082														x	x
091															
093														x	x
097														x	
100	x	x				x						x			
101	x				x						x				x
102	x	x	x	x	x	x		(x)	(x)	x			x		
110														x	
111															
112														x	
114														x	
116														x	
117															
118a														x	
121														x	x
124														x	
129															
136														x	
139														x	
144														x	
148														x	
152														x	
164				x			x			(x)			x	x	

Table 4.4: continued

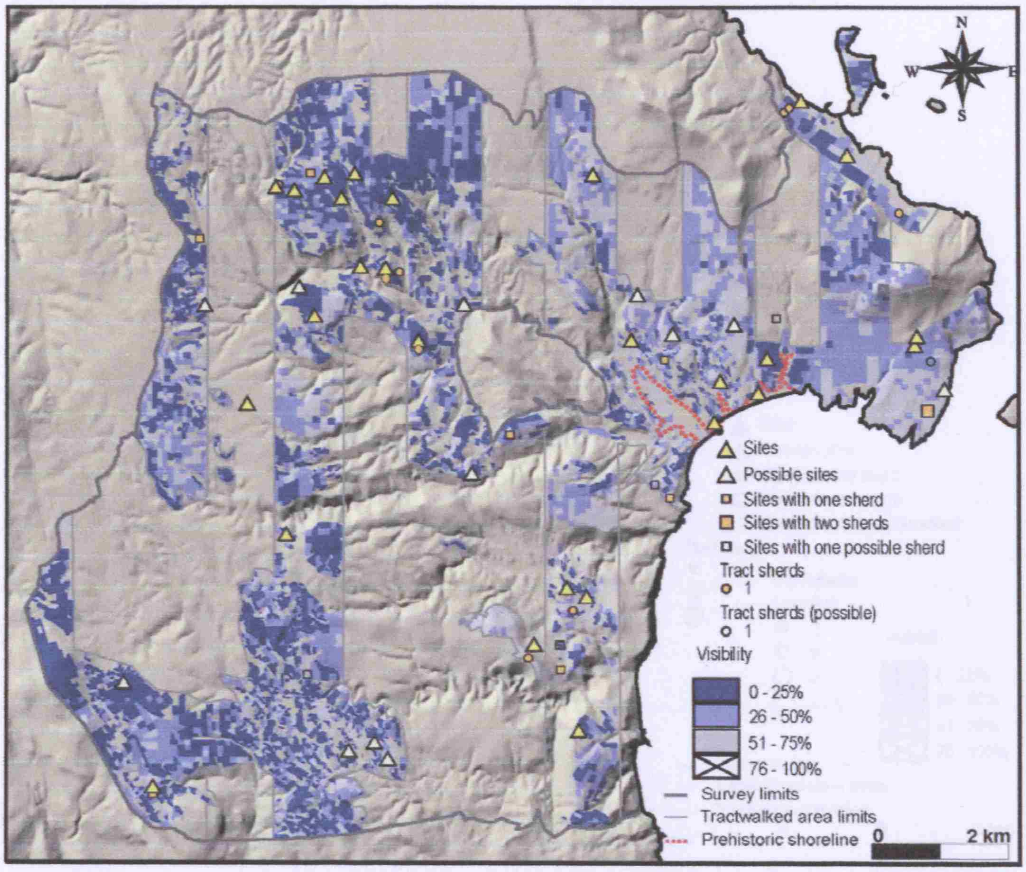


Figure 4.28: FN-EBI tract pottery in relation to FN-EB I sites

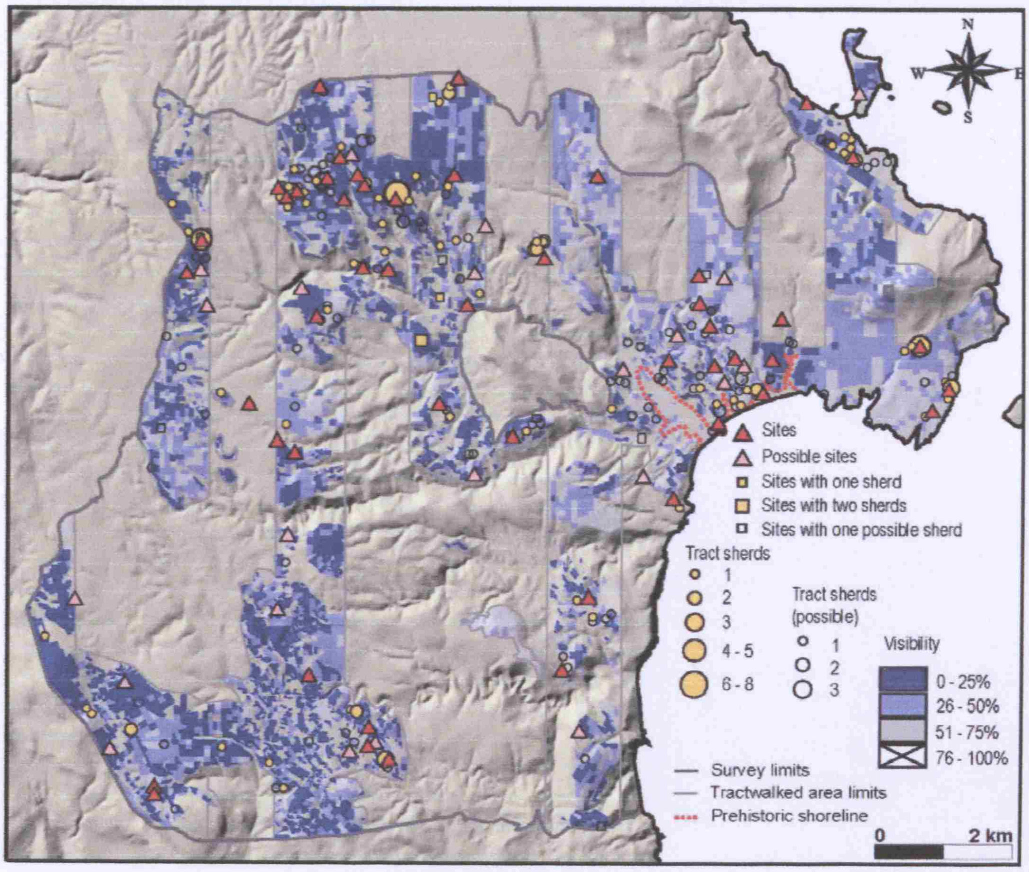


Figure 4.29: EB II+ tract pottery in relation to EB II+ sites

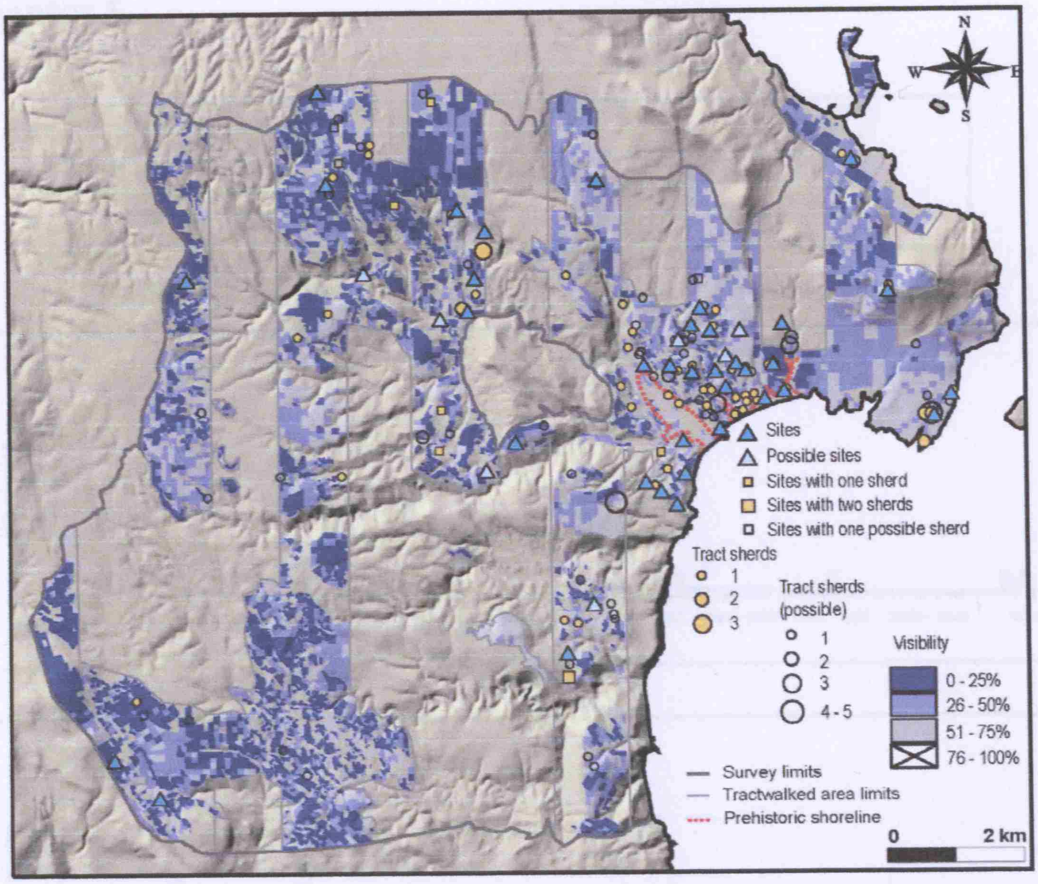
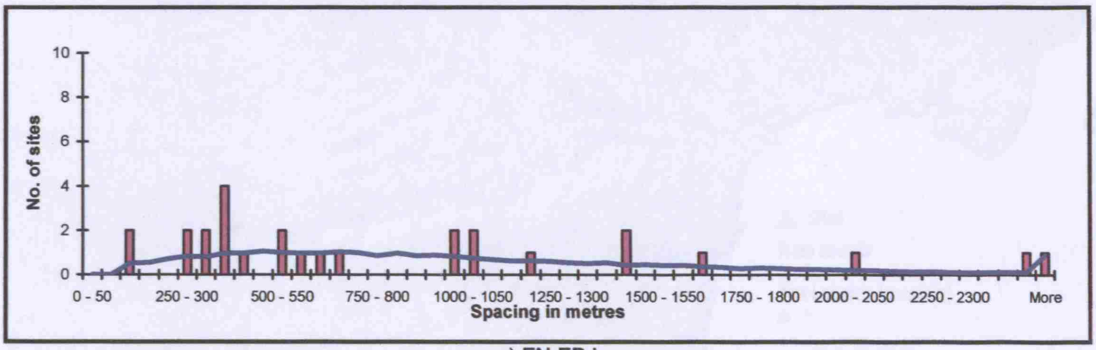


Figure 4.30: FMin tract pottery in relation to FMin sites

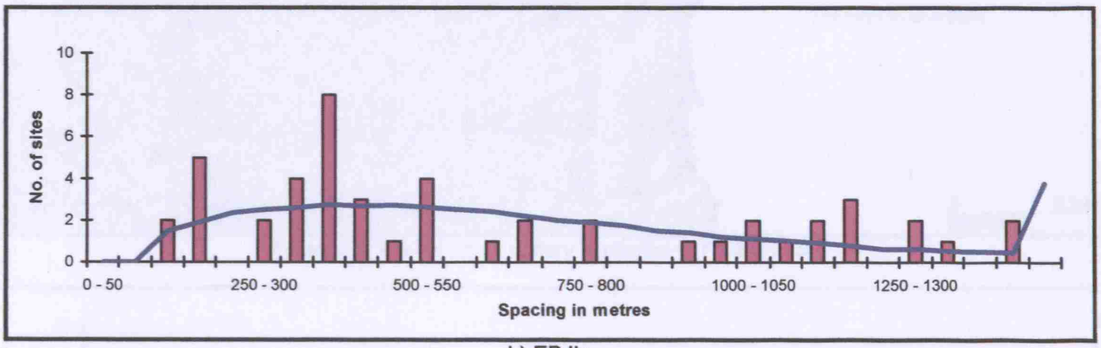
Chapter 5

Location\Phase	FN/EB I	EB II+	FMin
KIP survey area	27	49	36
Mitata plateau	6	10	2
Palaiopolis plain	5	10	19
Livadi/Pourko	1	6	2
KIP Transects	15	23	13

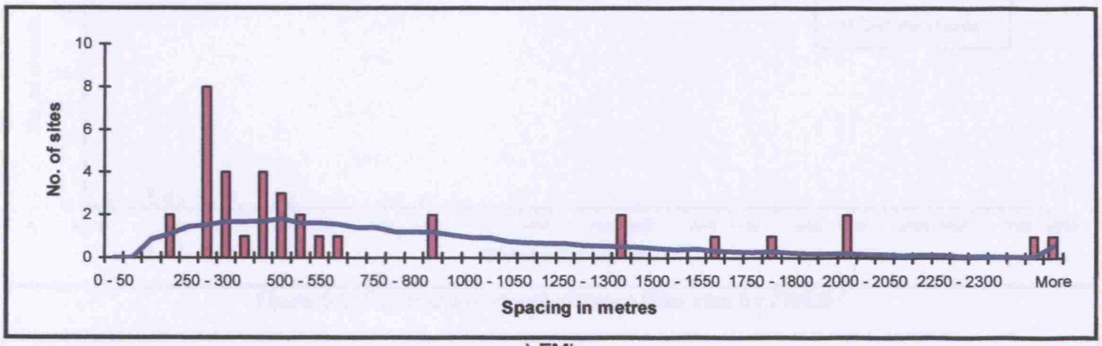
Table 5.1: Number sites in the survey and individual areas (FN-EBA components 1-3)



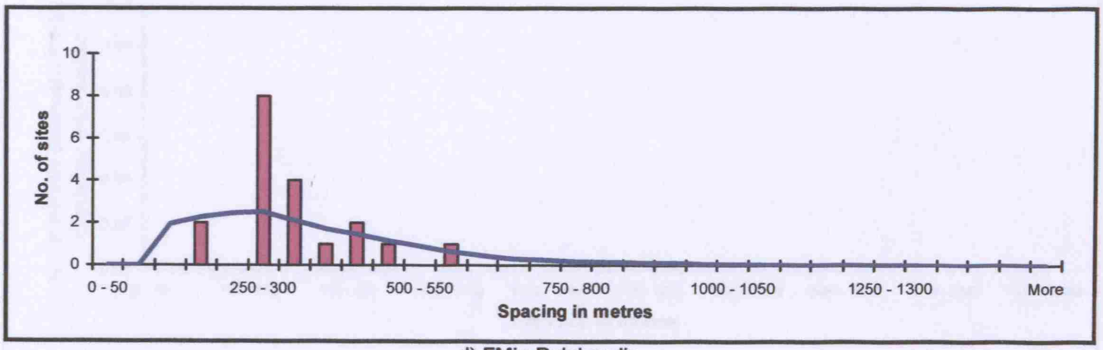
a) FN-EB I



b) EB II+



c) FMin



d) FMin Palaiopolis

Figure 5.1: Spacing of sites within the survey area

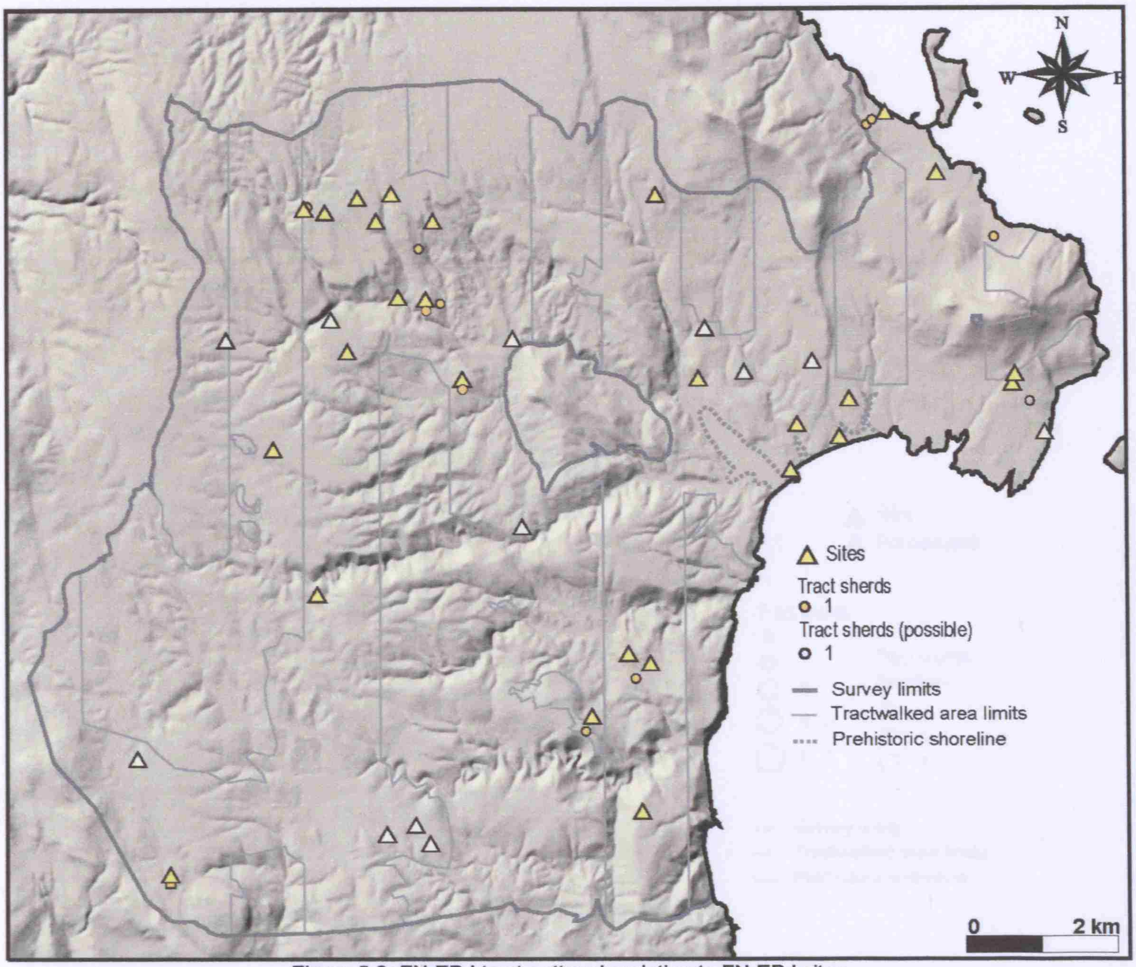


Figure 5.2: FN-EB I tract pottery in relation to FN-EB I sites

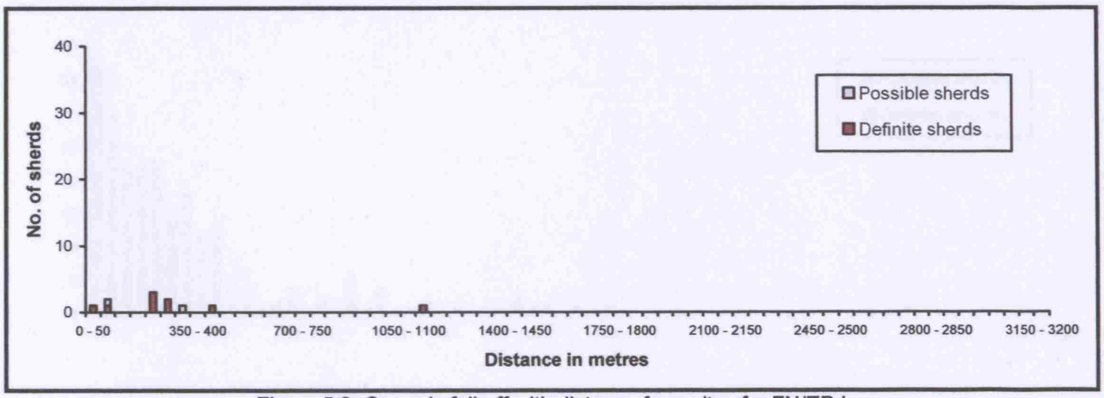


Figure 5.3: Ceramic fall-off with distance from sites for FN/EB I

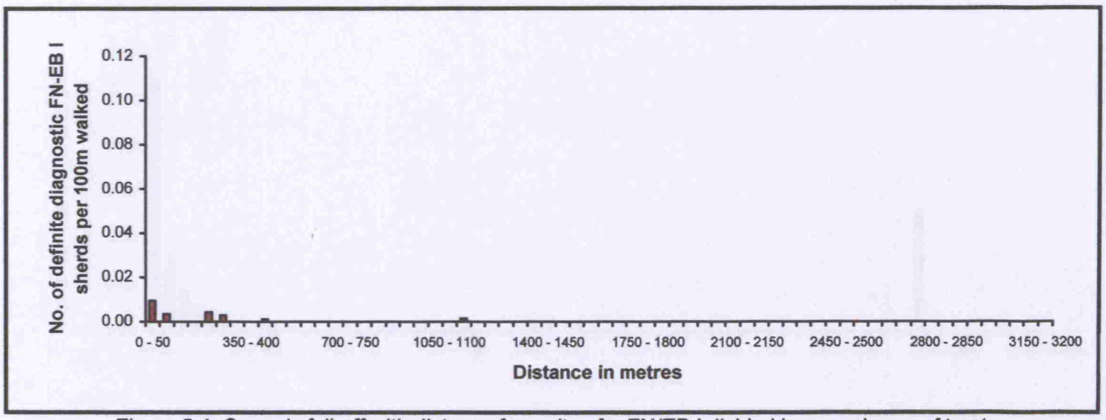


Figure 5.4: Ceramic fall-off with distance from sites for FN/EB I divided by paced area of tract

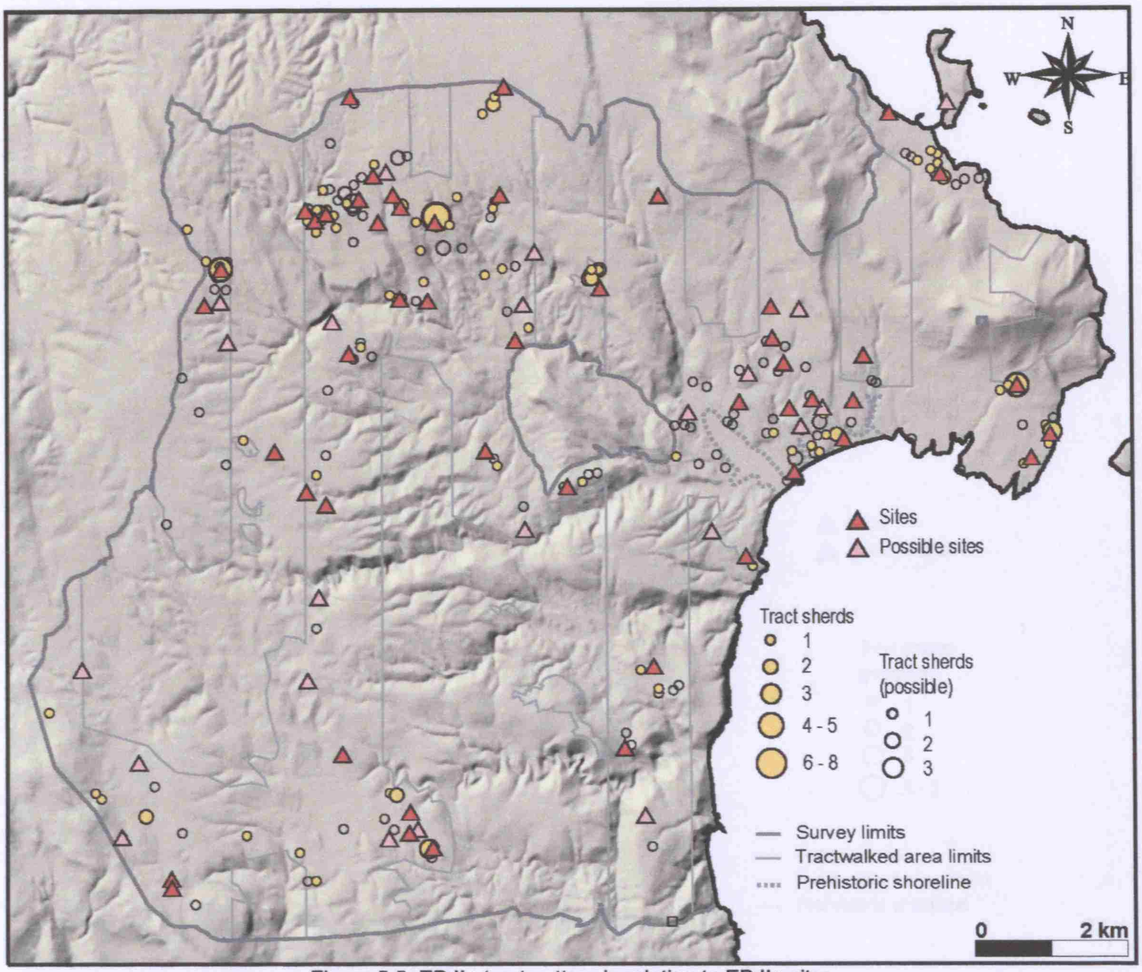


Figure 5.5: EB II+ tract pottery in relation to EB II+ sites

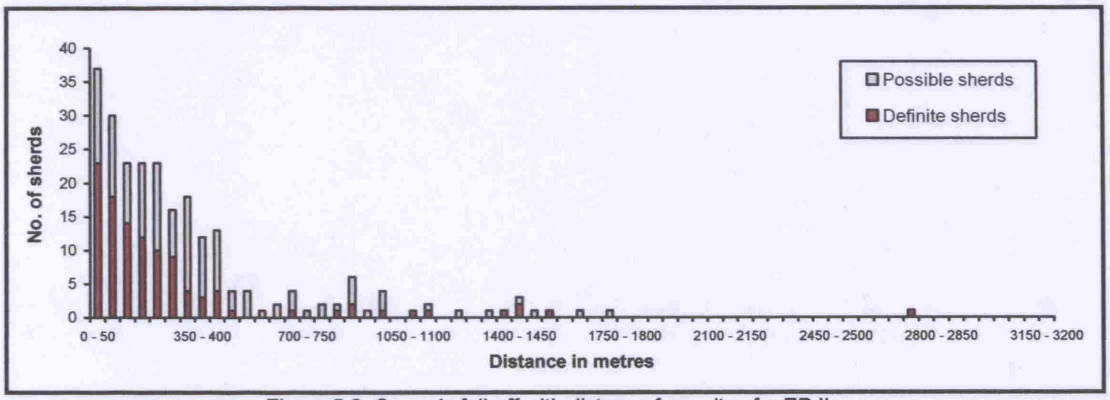


Figure 5.6: Ceramic fall-off with distance from sites for EB II+

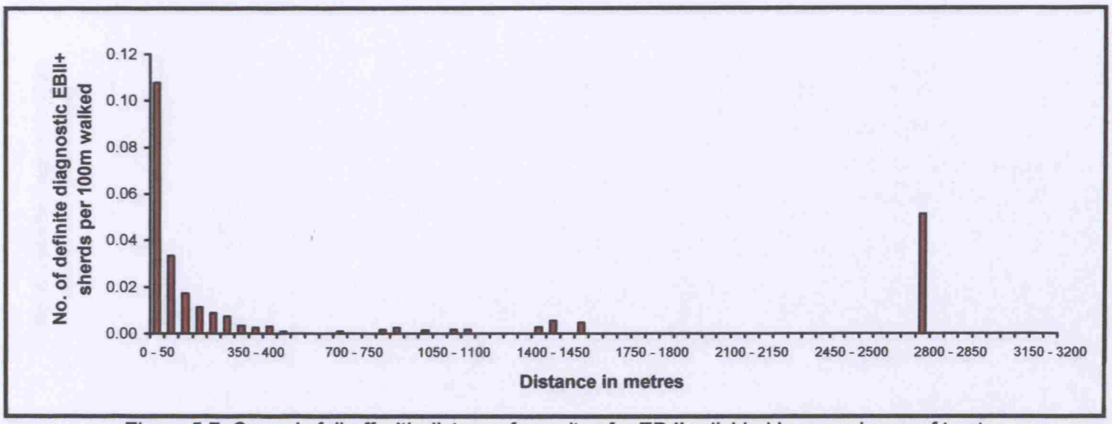


Figure 5.7: Ceramic fall-off with distance from sites for EB II+ divided by paced area of tract

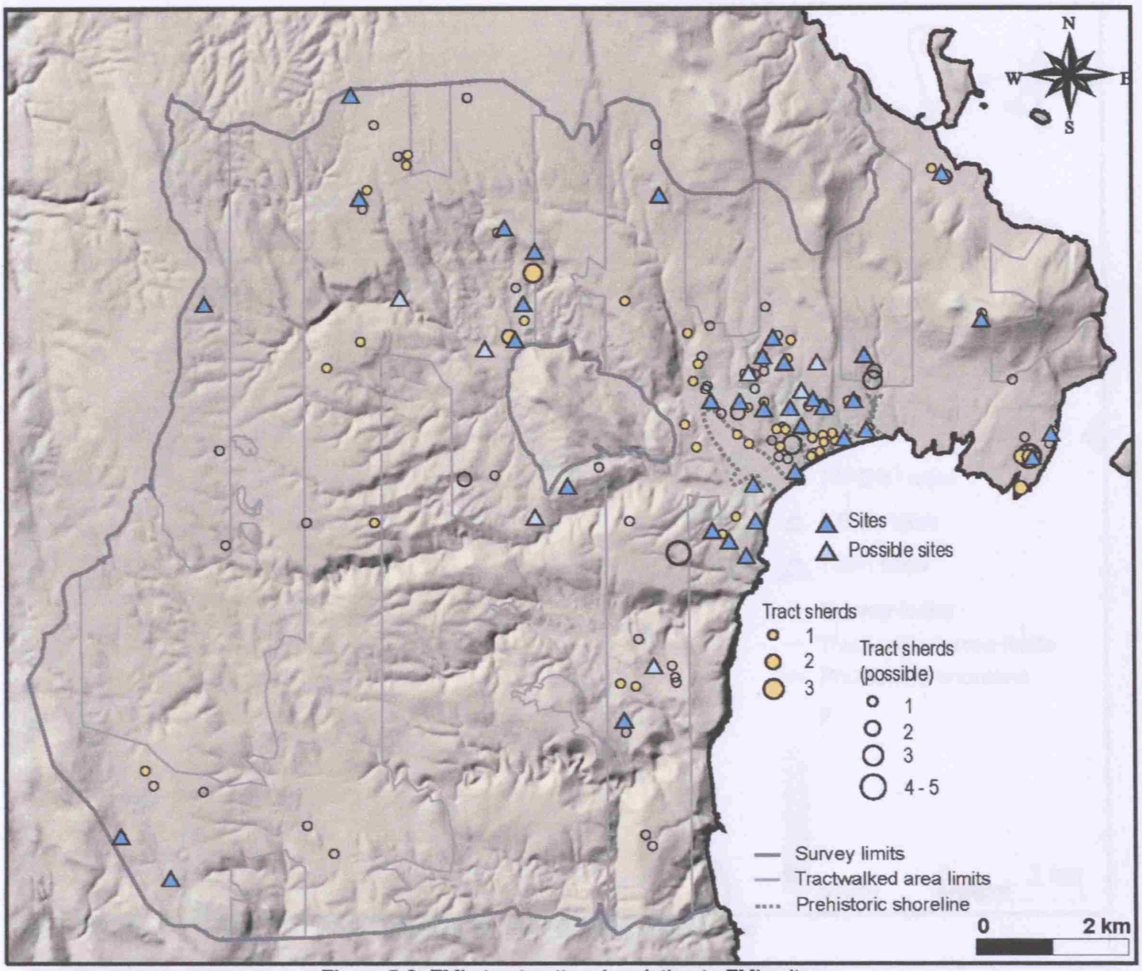


Figure 5.8: FMin tract pottery in relation to FMin sites

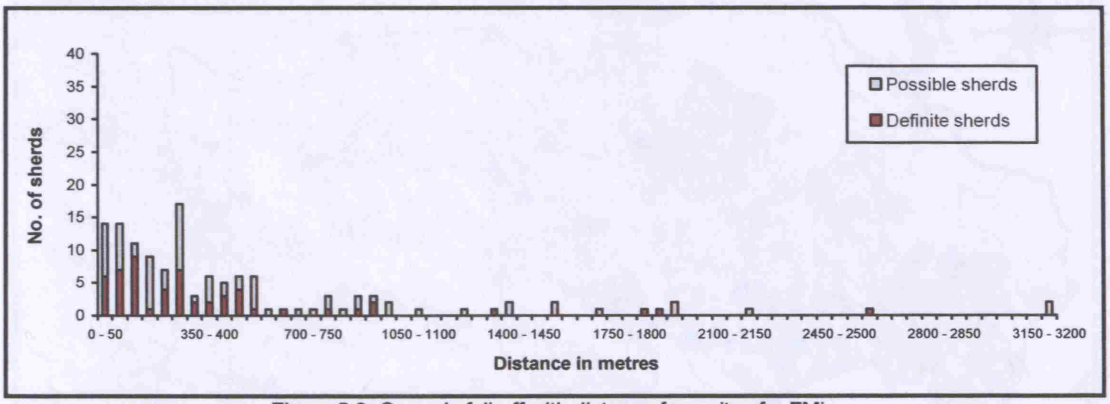


Figure 5.9: Ceramic fall-off with distance from sites for FMin

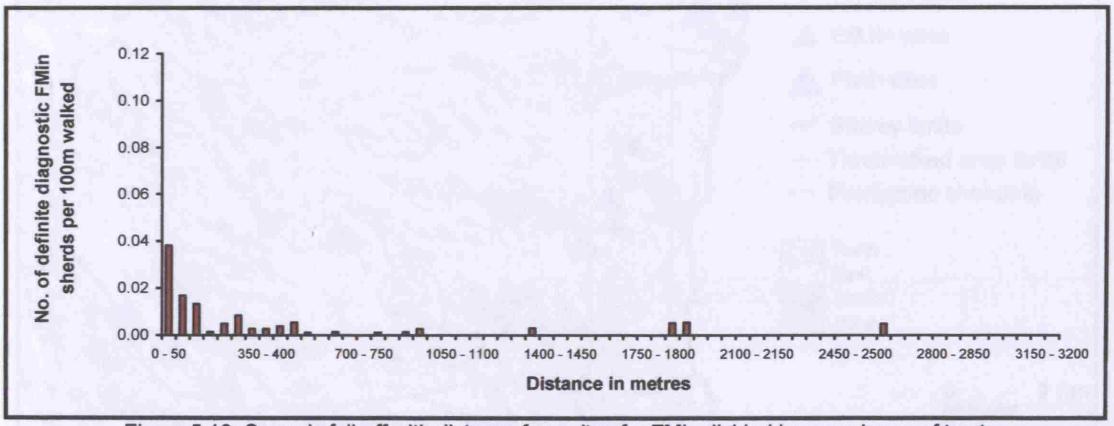


Figure 5.10: Ceramic fall-off with distance from sites for FMin divided by paced area of tract

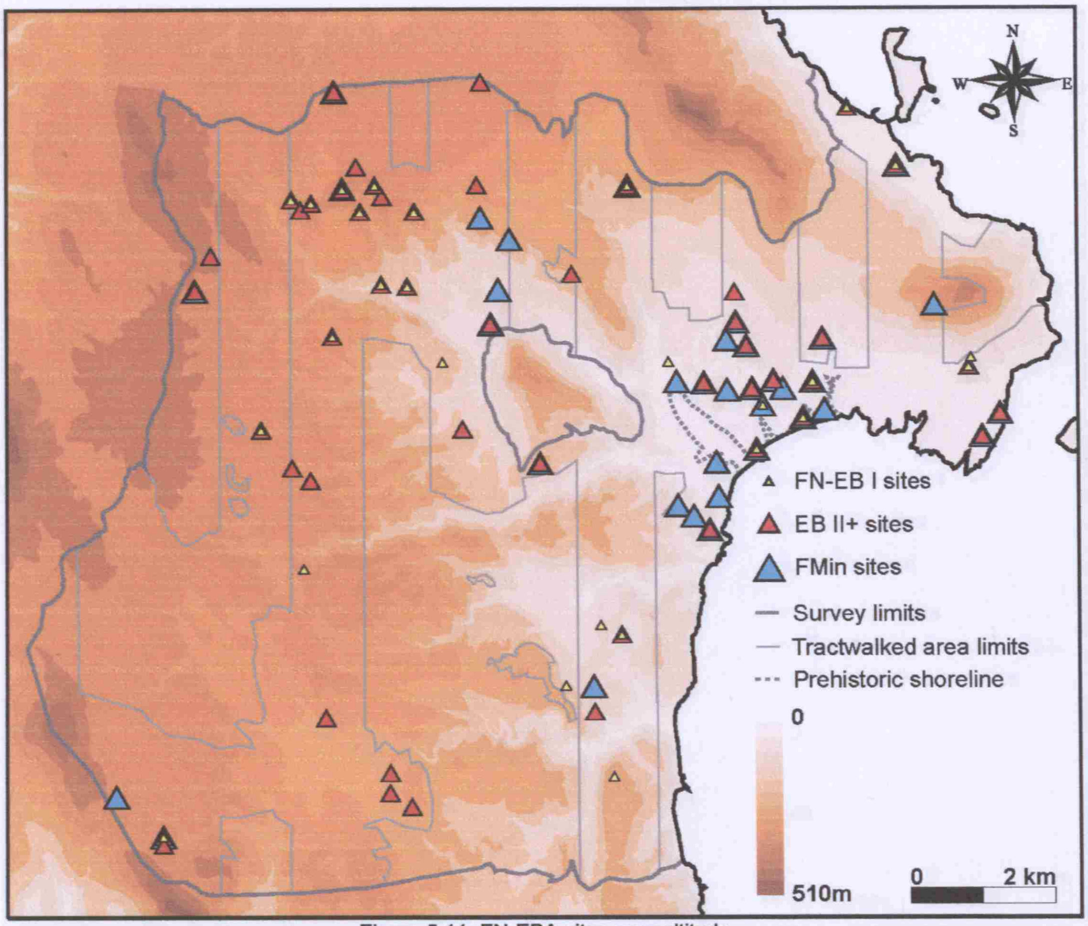


Figure 5.11: FN-EBA sites over altitude

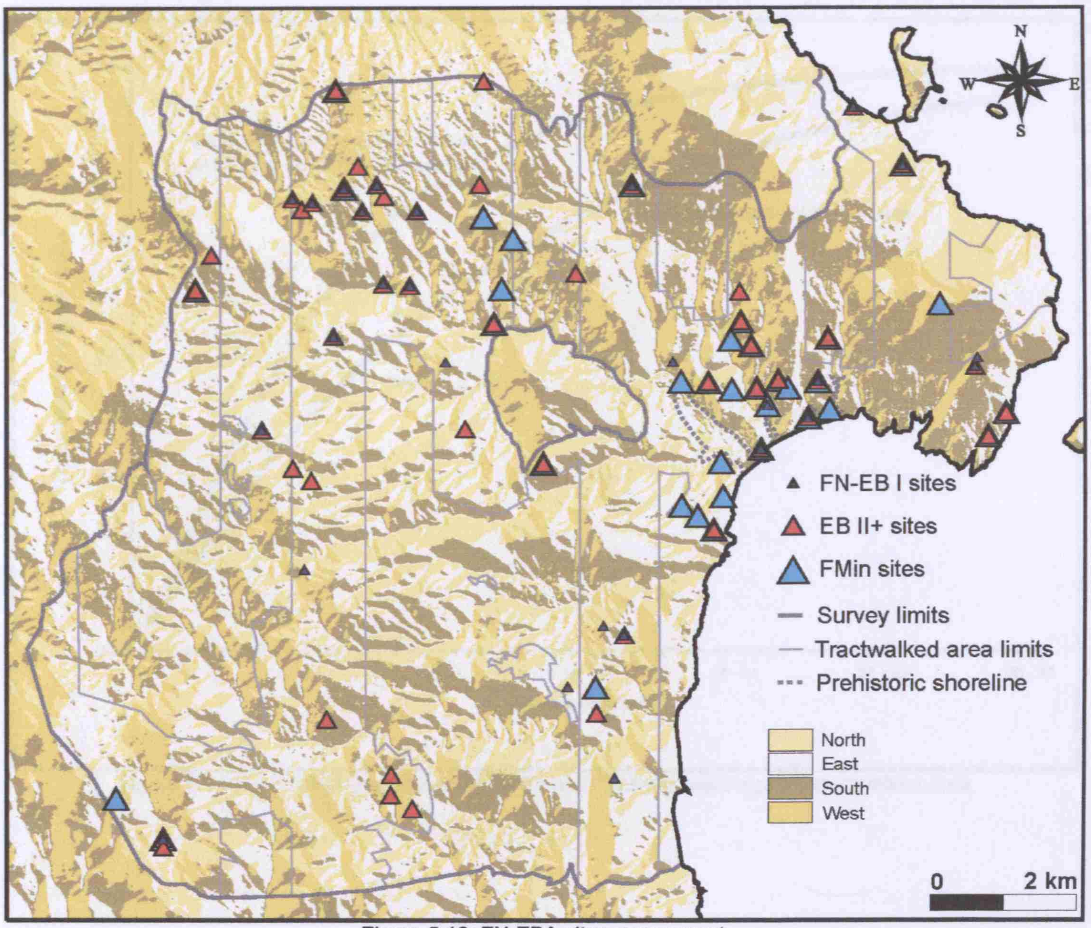


Figure 5.12: FN-EBA sites over aspect

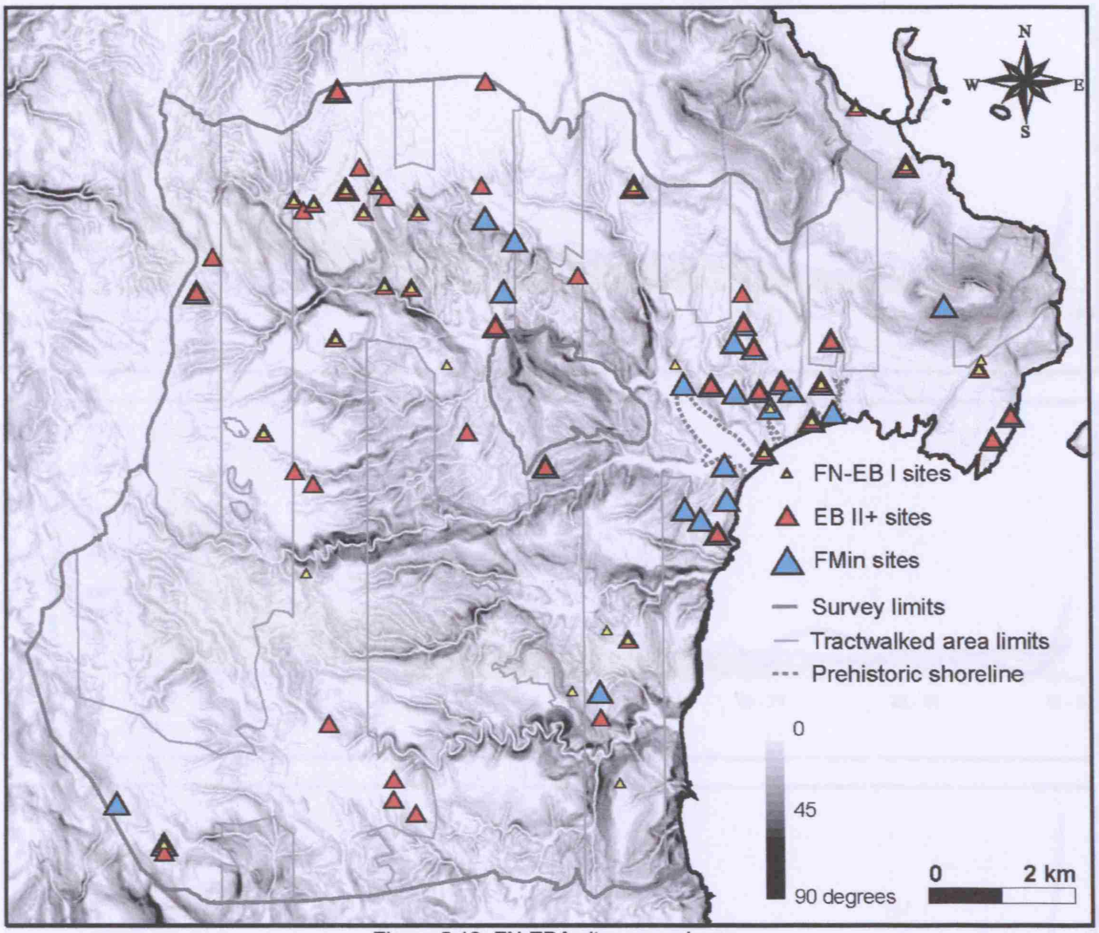


Figure 5.13: FN-EBA sites over slope

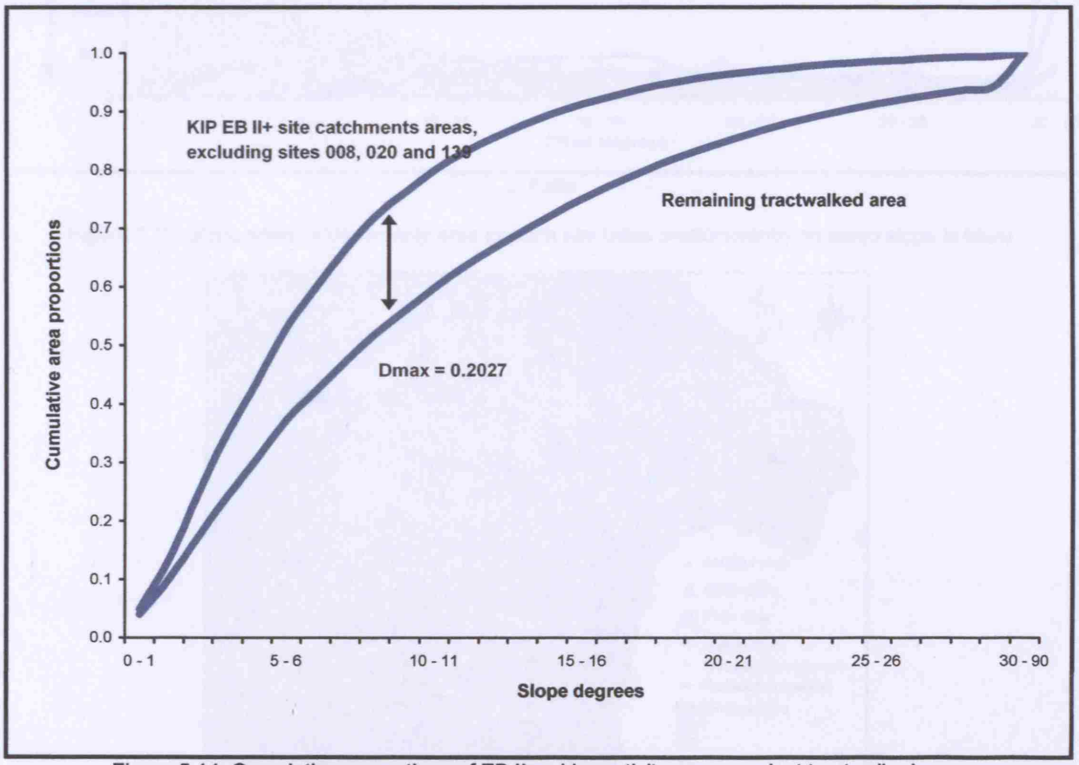
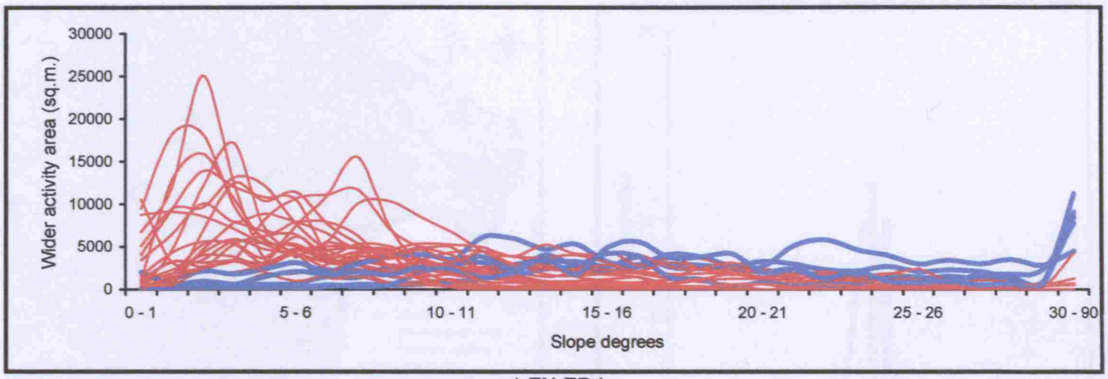
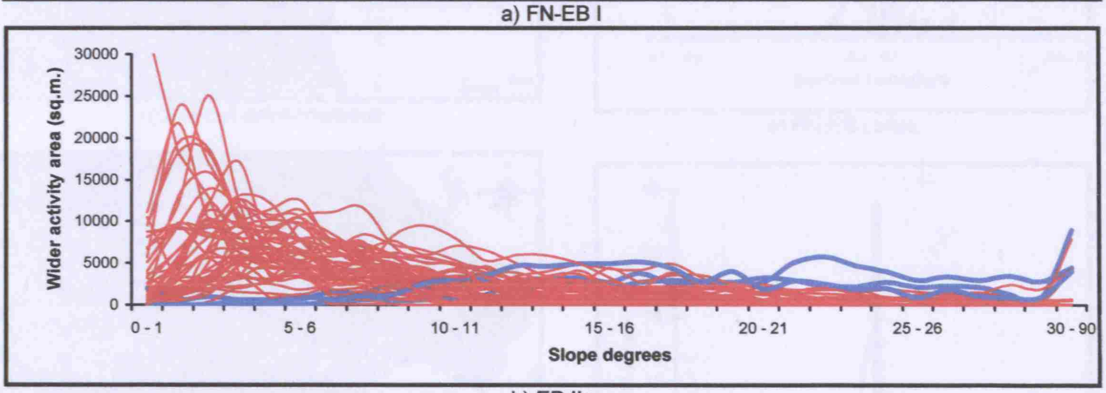


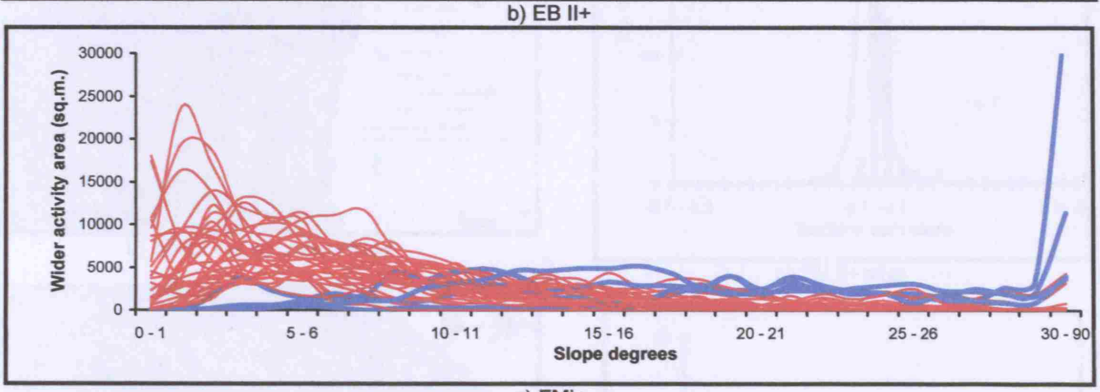
Figure 5.14: Cumulative proportions of EB II+ wider activity areas against tractwalked area



a) FN-EB I



b) EB II+



c) FMin

Figure 5.15: Slope within wider activity area of each site (sites predominantly on steep slope in blue)

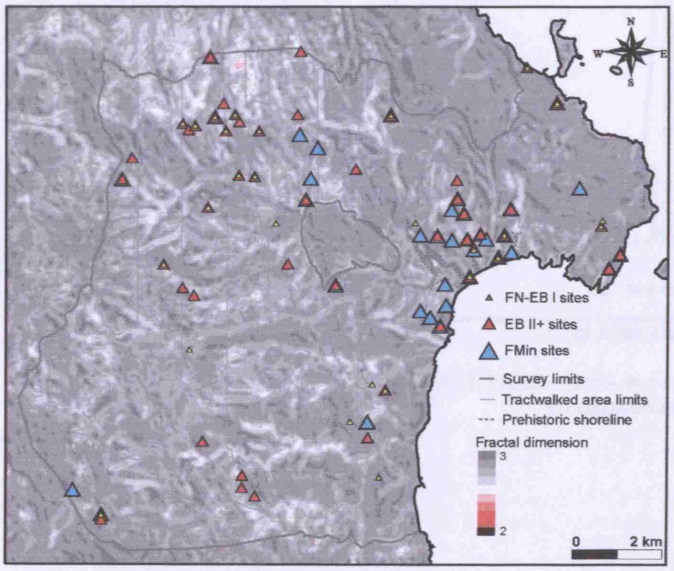
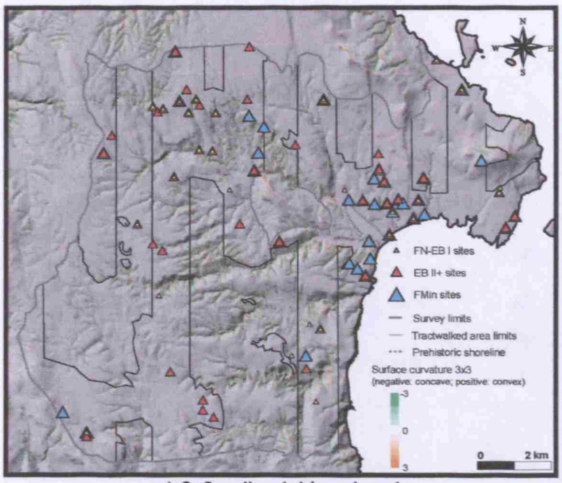
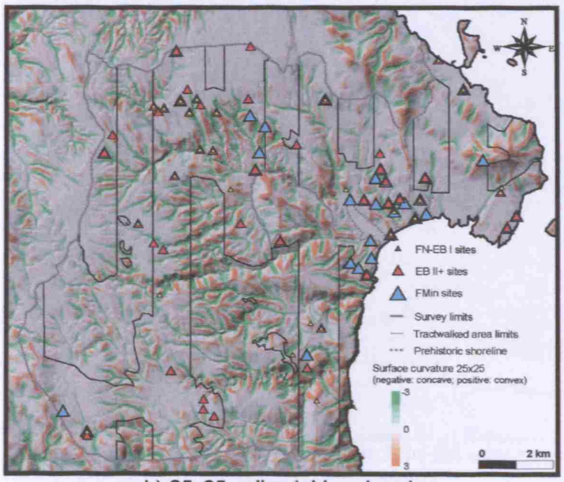


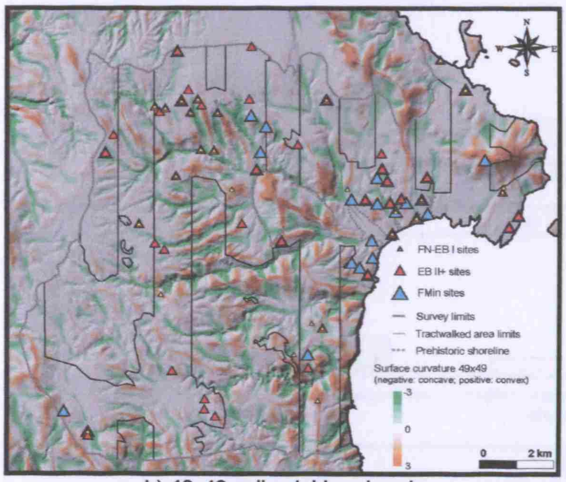
Figure 5.16: FN-EBA sites over fractal dimension of landscape (i.e. the spatial variation in terrain roughness)



a) 3x3 cell neighbourhood

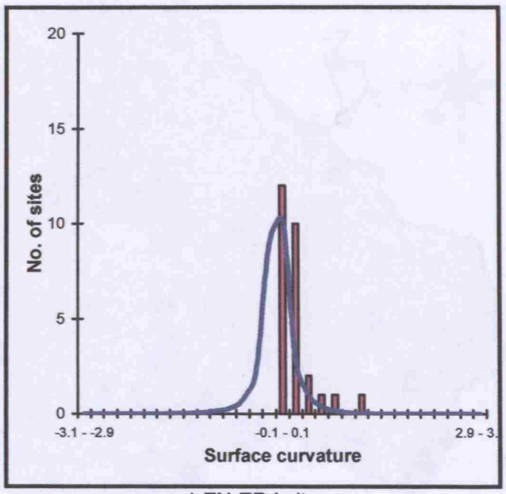


b) 25x25 cell neighbourhood

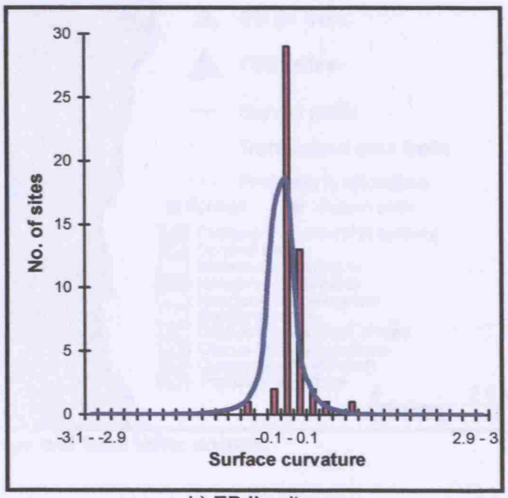


b) 49x49 cell neighbourhood

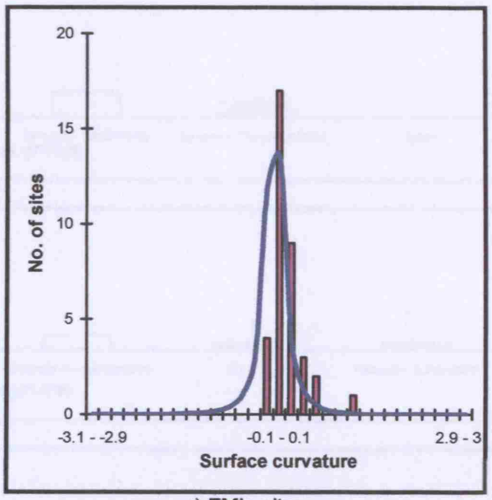
Figure 5.17: FN-EBA sites over surface curvature



a) FN-EB I sites



b) EB II+ sites



c) FMin sites

Figure 5.18: FN-EBA sites and surface curvature (25x25 cell neighbourhood)

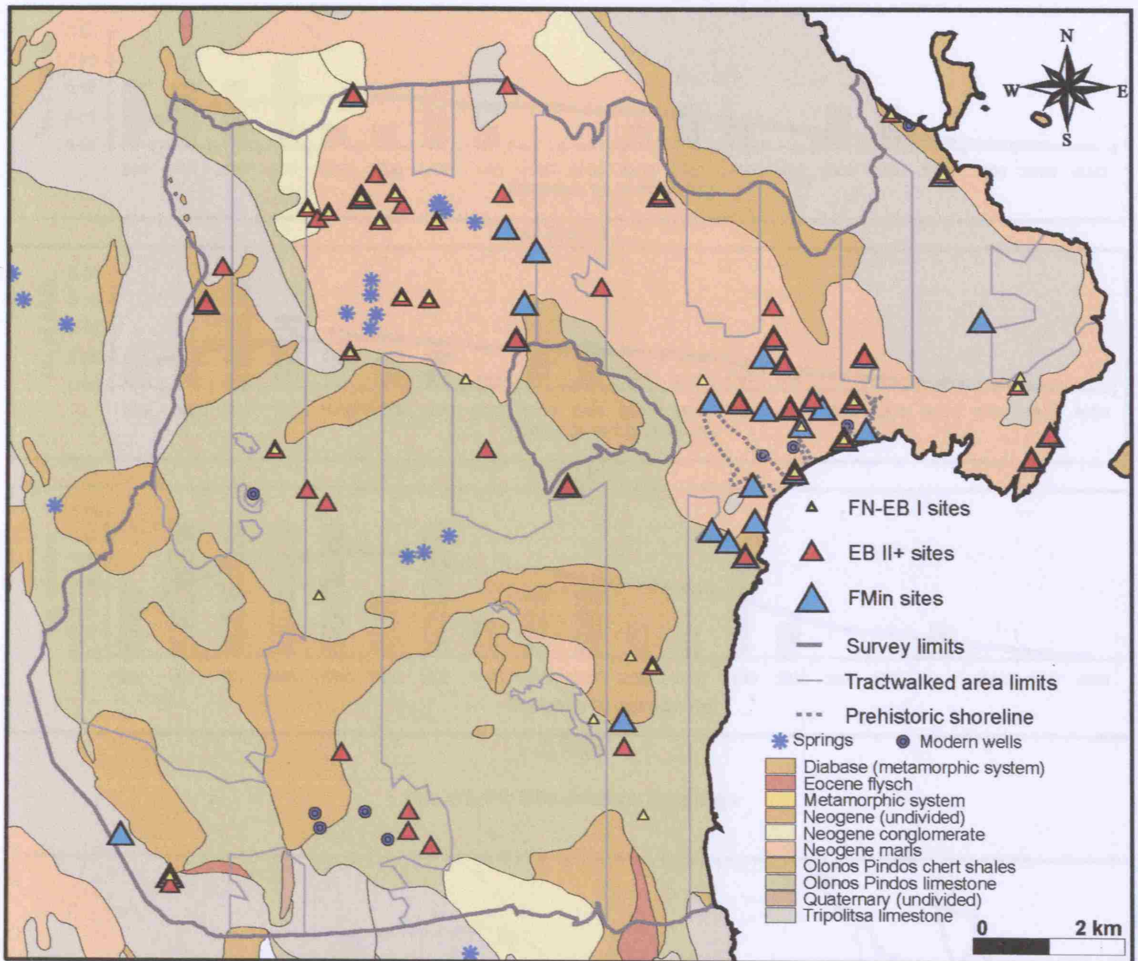


Figure 5.19: FN-EBA sites over geology and fresh water sources

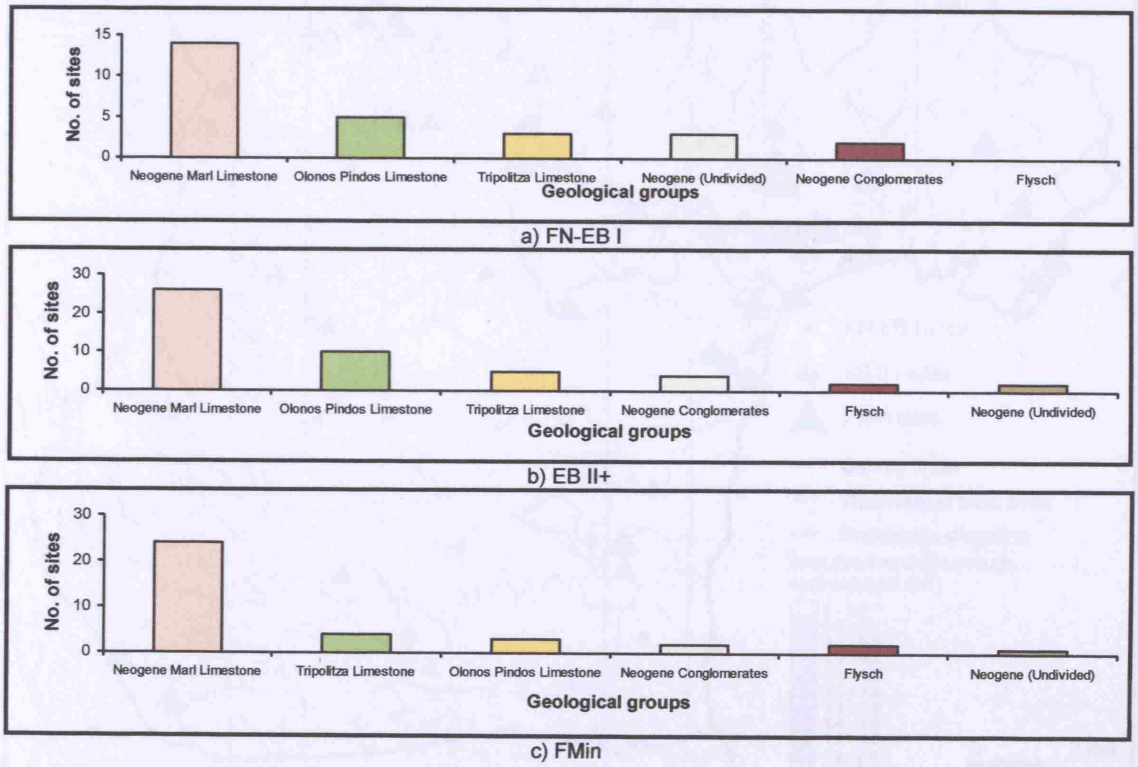
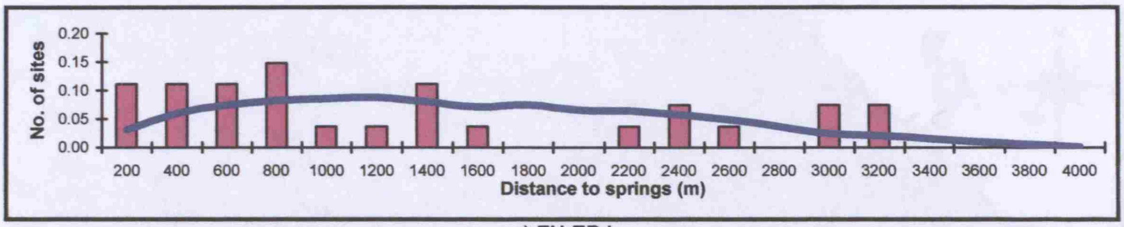
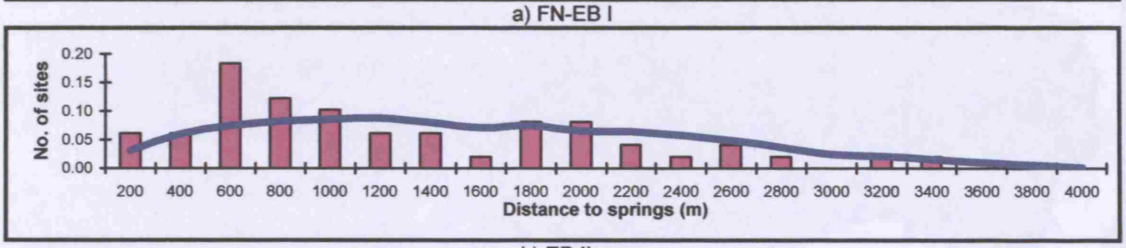


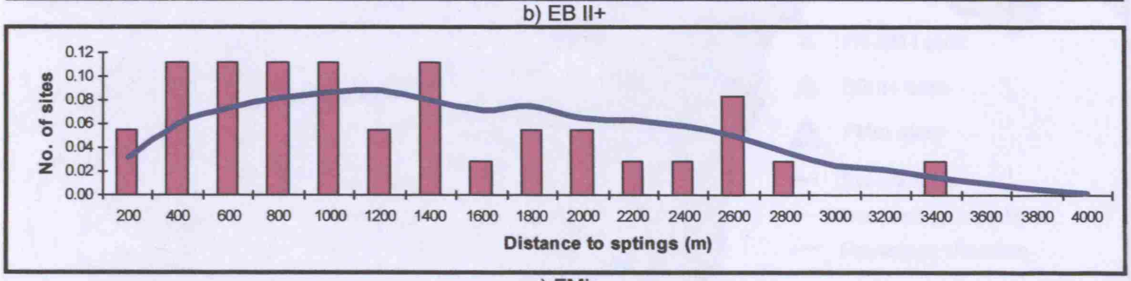
Figure 5.20: Number of FN-EBA sites per geological group



a) FN-EB I



b) EB II+



c) FMin

Figure 5.21: Site distance to springs

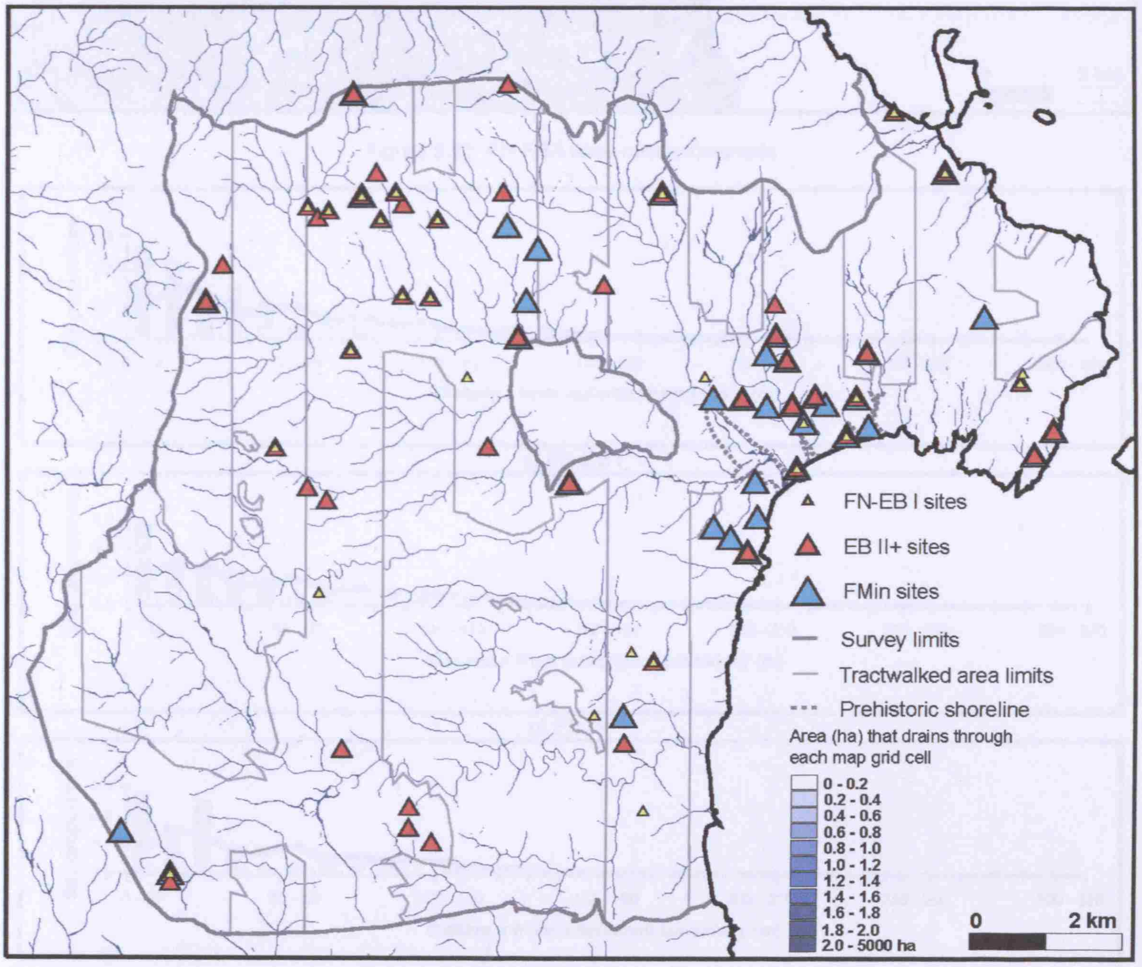


Figure 5.22: FN-EBA sites over water runoff

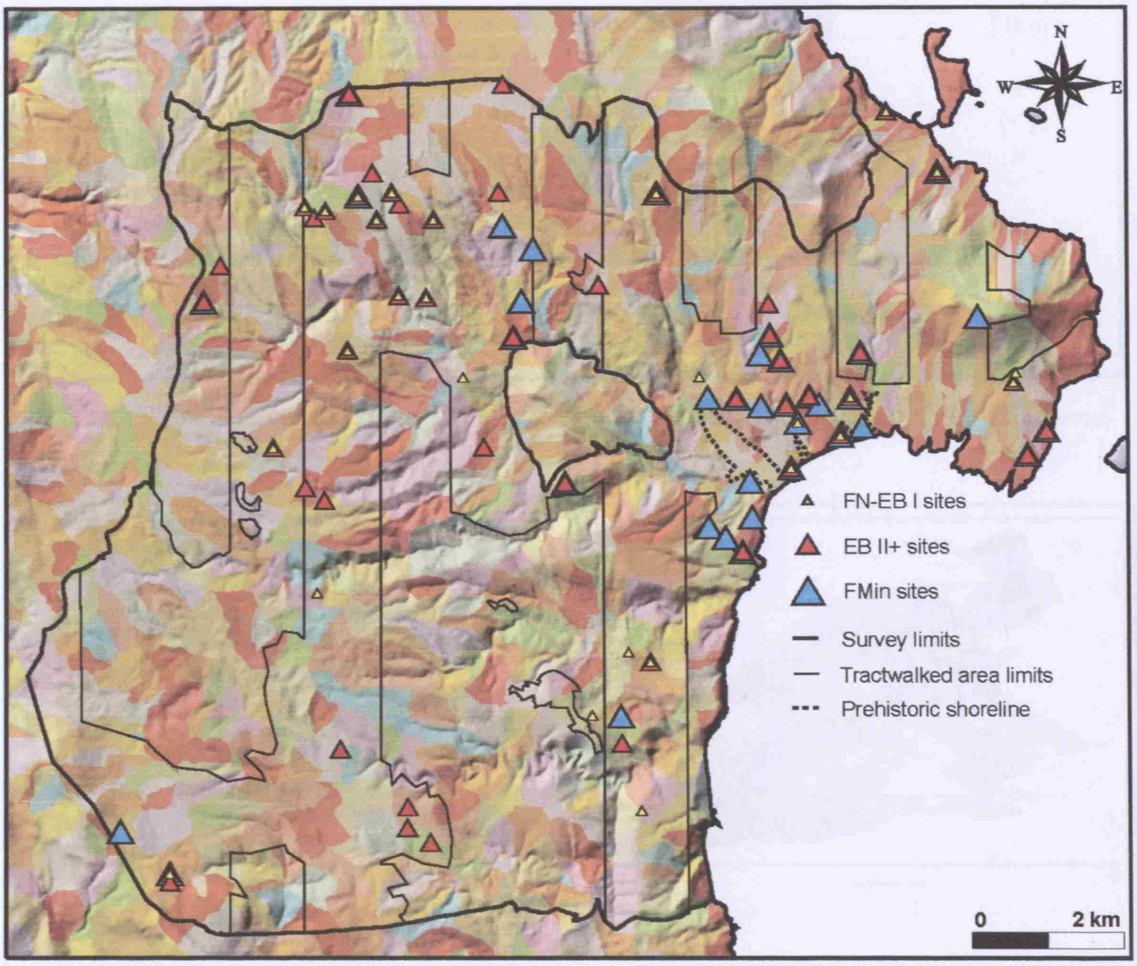


Figure 5.23: FN-EBA sites over watersheds

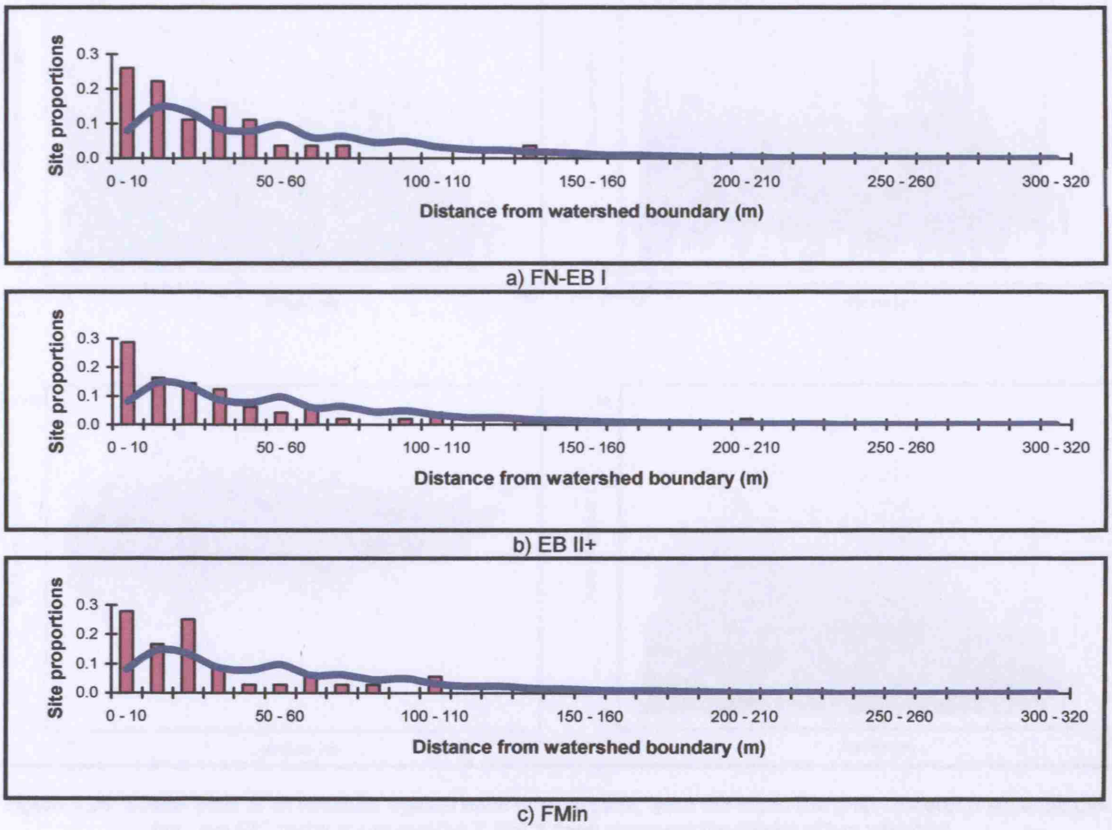


Figure 5.24: Site distance to watershed boundaries

Variable/FN-EBA phase	FN-EB I	EB II+	FMin
Altitude	x	x	✓
Slope	x	✓	x
Aspect	x	x	(✓)
Fractal dimension	x	x	x
Surface curvature	✓	✓	✓
Geology	x	✓	✓
Proximity to fresh water	(✓)	✓	x
Flow accumulation	x	x	✓
Watersheds	✓	✓	✓
Coastal proximity	x	x	✓

Table 5.2: Environmental variables explored, and statistical results for each phase (✓= statistically significant; x=not statistically significant)

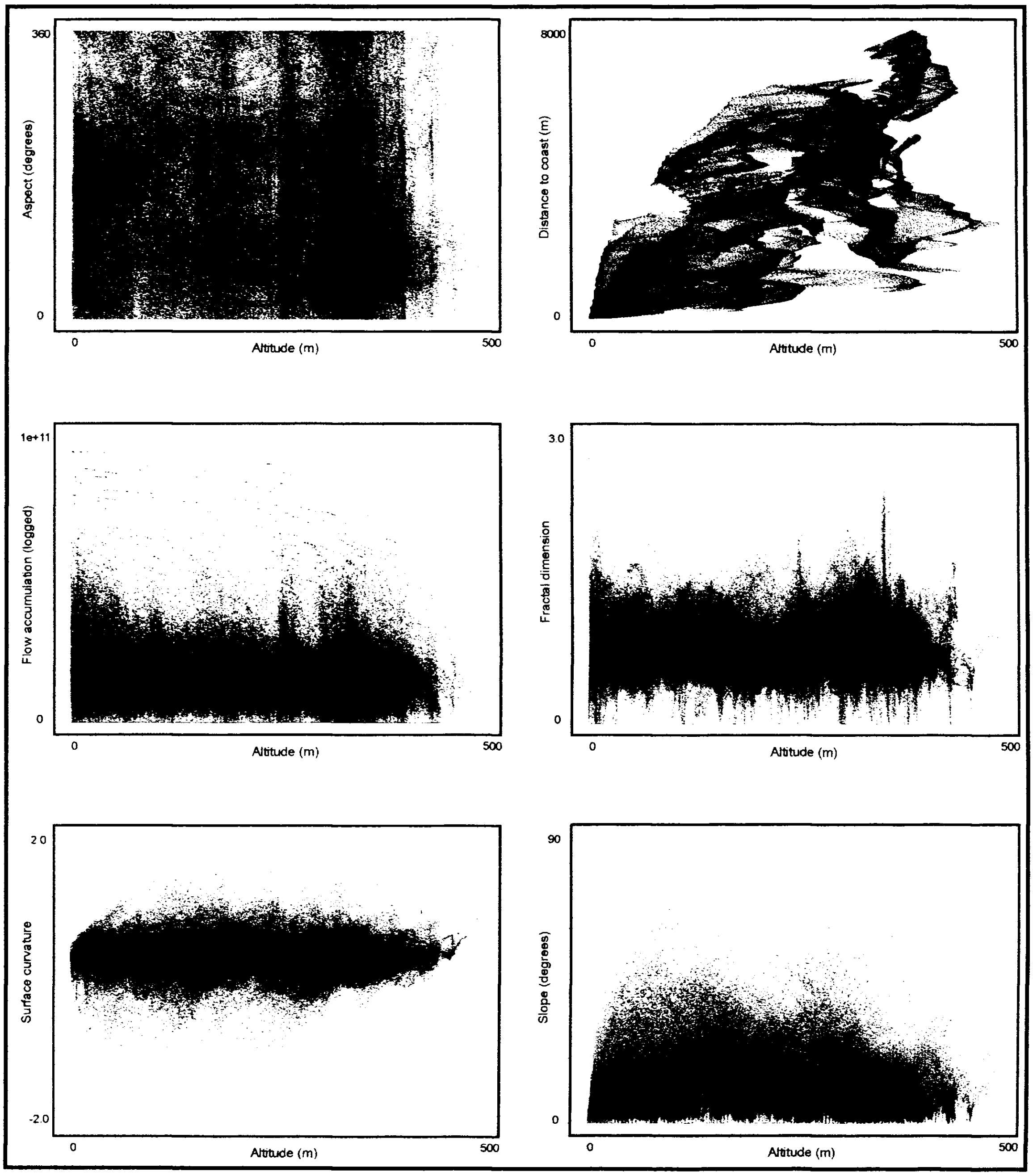


Figure 5.25: Scatter plots of all variables against each other in pairs; each dot within the graph reflects a separate cell from the GIS raster maps and the X and Y axes represent the values of two variables.

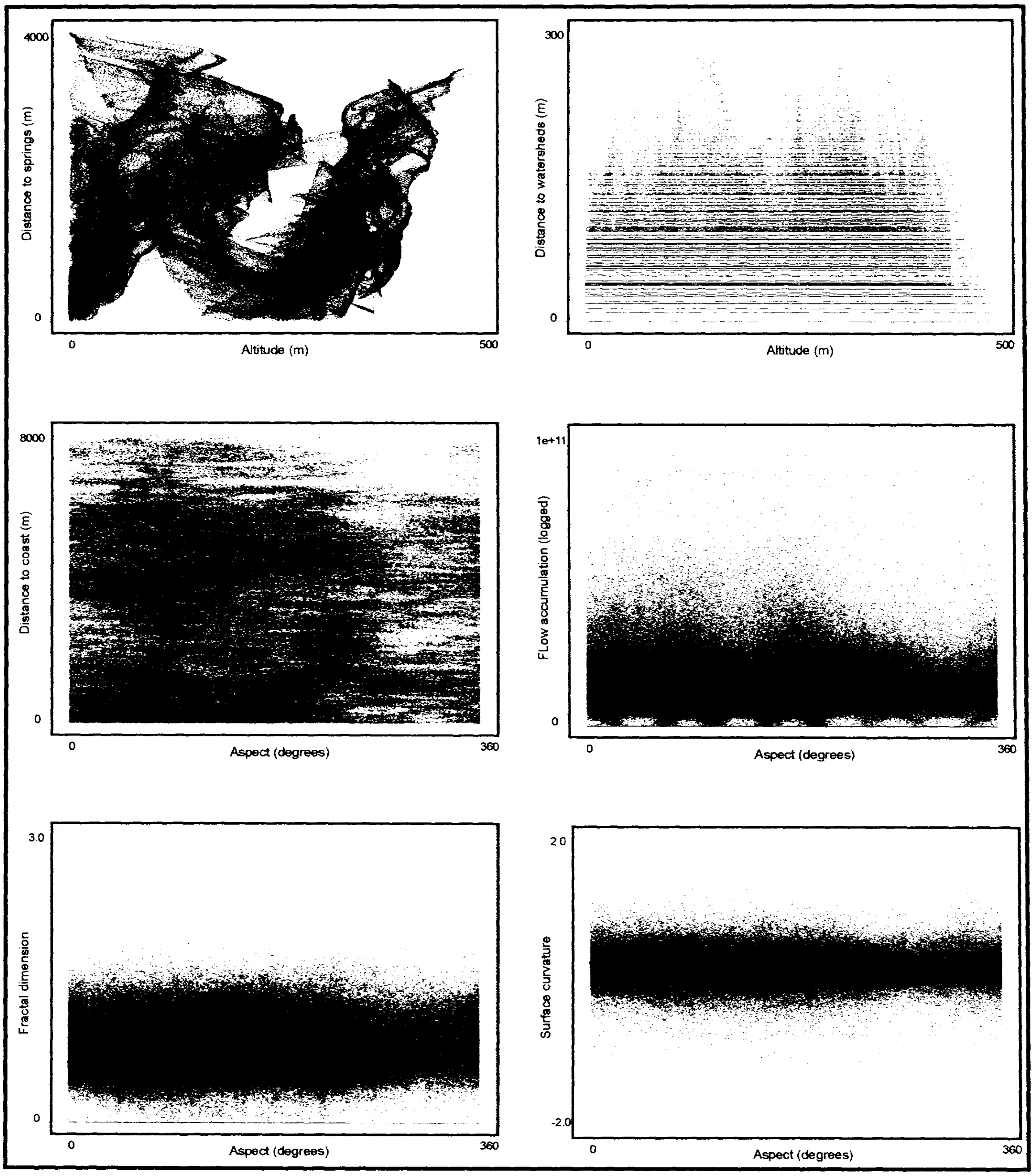


Figure 5.25 continued

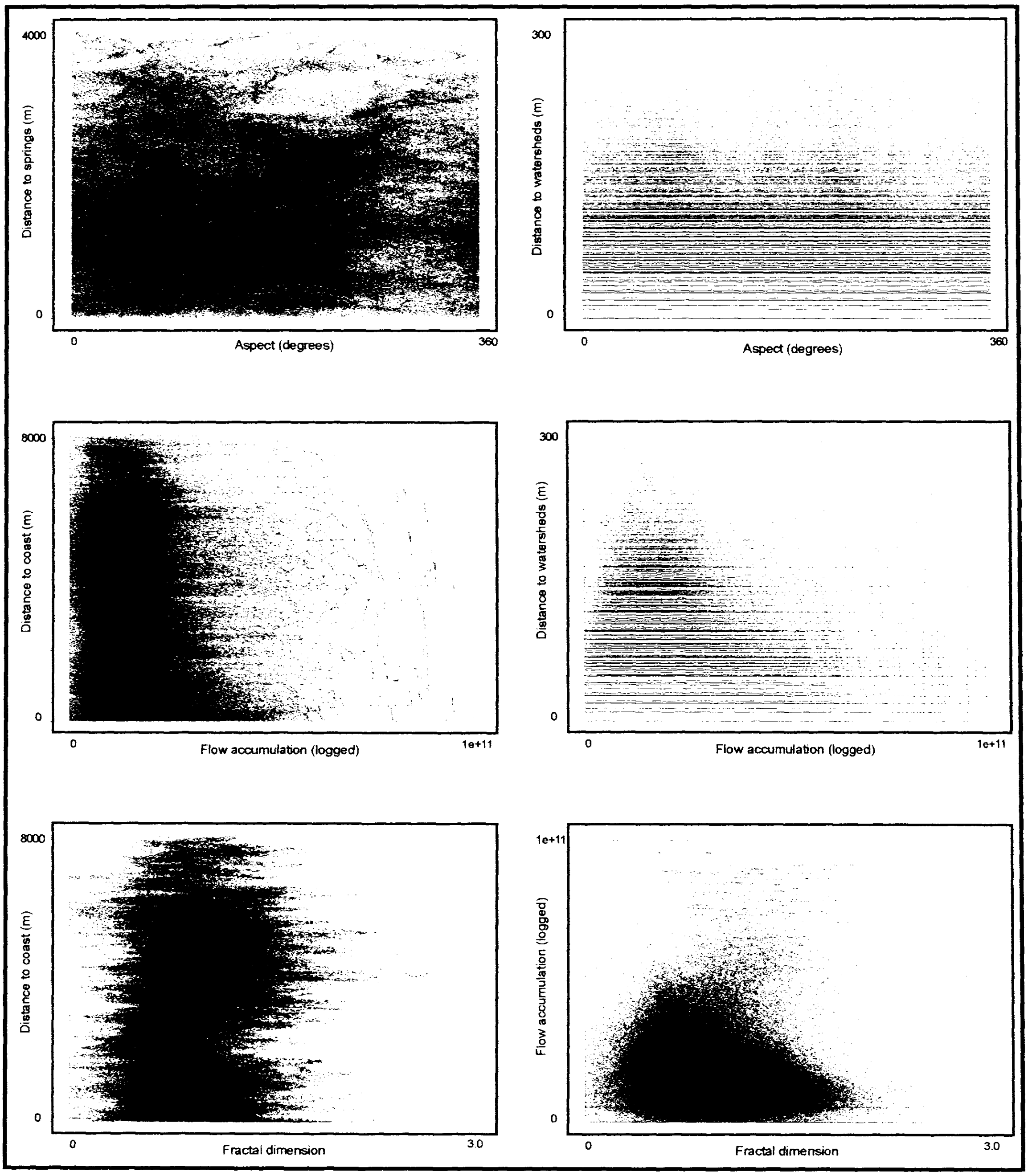


Figure 5.25 continued

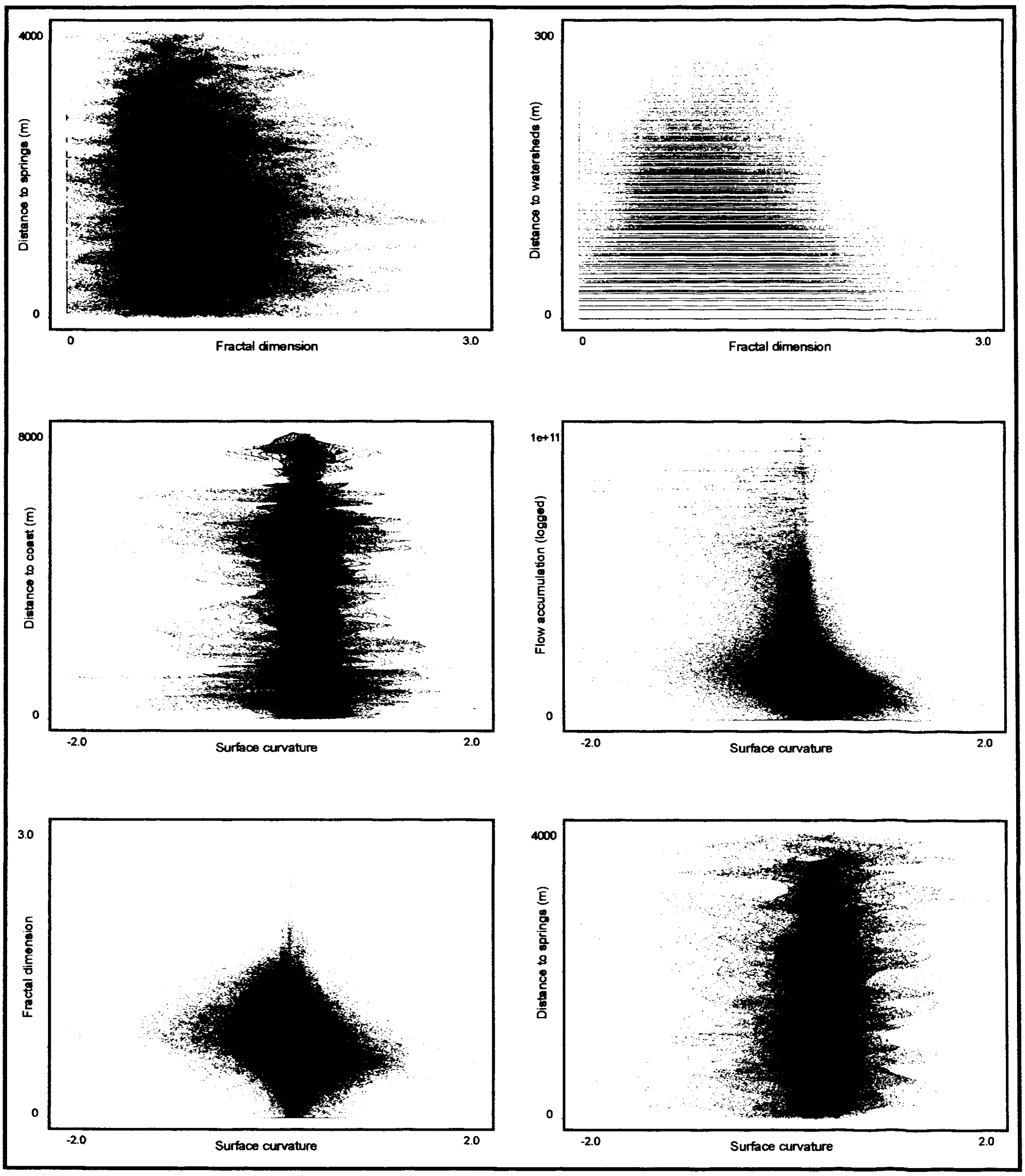


Figure 5.25 continued

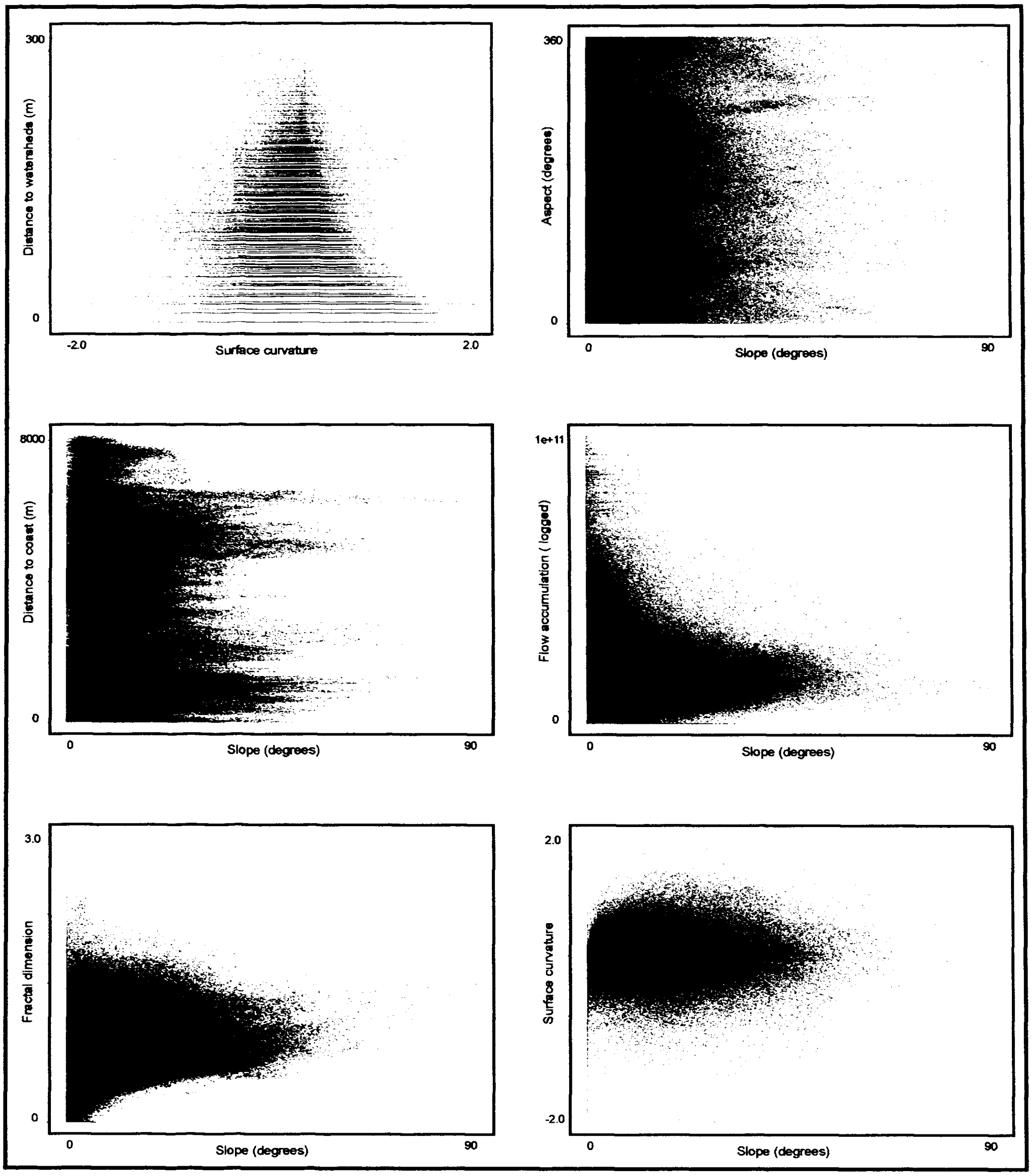


Figure 5.25 continued

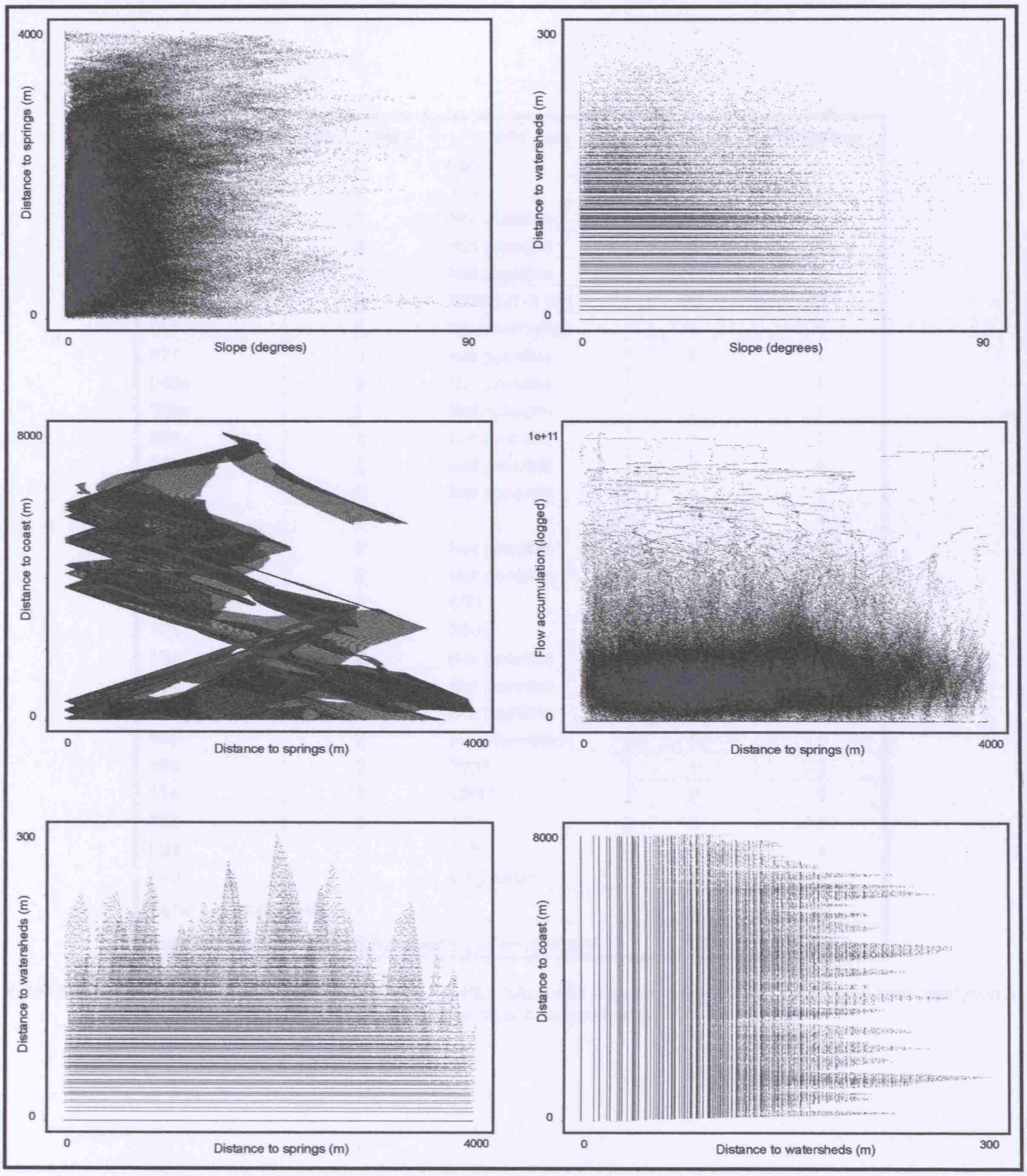


Figure 5.25 continued

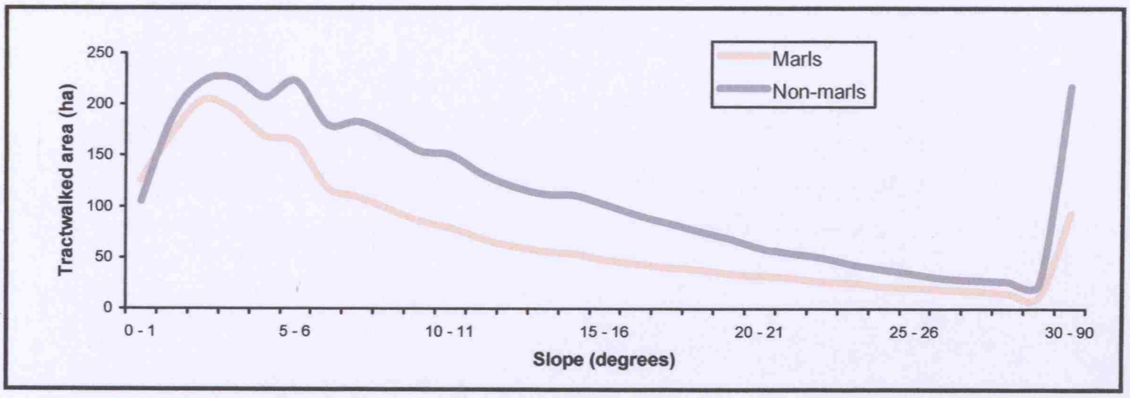


Figure 5.26: Marl and non-marl areas within each slope category of the tractwalked area

Sites	Component	Site size	600sq.m	1000sq.m
004	3	650?	1	1
008	2	400	1	1
019	2	Not possible	1	1
020	2	Not possible	1	1
037	2	Not possible	1	1
064	2	17000 (1-2 ha)	28	17
068	1	No information	1	1
077	2	Not possible	1	1
085a	3	Not possible	1	1
085c	2	Not possible	1	1
088	1	Not possible	1	1
089	2	Not possible	1	1
091	2	Not possible	1	1
101	2	?	1	1
105	2	Not possible	1	1
108	2	Not possible	1	1
123	2	650	1	1
125	2	2000	3	2
134	2	Not possible	1	1
136	2	Not possible	1	1
138	2	Not possible	1	1
146	2	No information	1	1
164	2	700?	1	1
174	2	1000?	2	1
186	3	400	1	1
F20	1	0.06	1	1
F49	1	Very small	1	1
Total no. of households			**55**	**42**
Population if average of 5 persons per household			**275**	**210**

Table 5.3: Household and population numbers for FN-EB I (sites with a minimal component value have been assigned a minimum number of households)

Sites	Component	Site size	600sq.m	1000sq.m
001c	2	2300	4	2
003	3	7000	12	7
004	3	1200?	2	1
006	3	600	1	1
008	3	1600	3	2
013	2	Not possible	1	1
019	2	Not possible	1	1
020	2	Not possible	1	1
023	3	Not possible	1	1
029	3	2100	4	2
032	2	700?	1	1
037	2	800	1	1
049	2	1000	2	1
051	2	Not possible	1	1
057	2	Not possible	1	1
064	2	45000 (4-5 ha)	75	45
067	2	1500?	3	2
068	2	800???	1	1
069	1	Not possible	1	1
072	2	10100	17	10
074	2	4600?	8	5
078	2	Not possible	1	1
084	3	2000?	3	2
085a	3	700	1	1
085b	3	1100	2	1
085c	3	6000	10	6
088	2	Not possible	1	1
090	3	2200	4	2
091	2	Not possible	1	1
093	1	3000	5	3
097	2	800???	1	1
101	1	?	1	1
108	2	Not possible	1	1
109	2	2000	3	2
112	2	1200	2	1
118	1	?	1	1
121	2	Not possible	1	1
124	3	Not possible	1	1
125	3	2000	3	2
134	2	700?	1	1
136	3	Not possible	1	1
139	3	1500	3	2
153	1	?	1	1
156	3	8700	15	9
157	2	Not possible	1	1
161	2	Not possible	1	1
164	3	2600	4	3
166	3	1600	3	2
Total no. of households			213	138
Population if average of 5 persons per household			1065	690

Table 5.4: Household and population numbers for EB II+ (sites with a minimal component value have been assigned a minimum number of households)

Sites	Component	Site size	600sq.m	1000sq.m
004	3	250	1	1
013	2	Not possible	1	1
032	2	Not possible	1	1
060	1	2000?	3	2
064	3	49000 (4-5 ha)	82	49
068	2	1000?	2	1
069	1	No information	1	1
072	2	2800	5	3
073	3	2000	3	2
074	2	?	1	1
078	2	Not possible	1	1
079	2	Not possible	1	1
081	2	Not possible	1	1
082	3	Not possible	1	1
091	1	Not possible	1	1
093	2	7300	12	7
097	2	2000?	3	2
100	3	550	1	1
101	3	350?	1	1
102	3	250?	1	1
110	2	3900?	7	4
111	1	Not possible	1	1
112	2	Not possible	1	1
114	1	No information	1	1
116	1	?	1	1
117	1	?	1	1
118	3	2100	4	2
121	2	Not possible	1	1
124	2	Not possible	1	1
129	1	Not possible	1	1
136	3	Not possible	1	1
139	1	Not possible	1	1
144	3	Not possible	1	1
146	2	No information	1	1
152	1	Not possible	1	1
164	2	800	1	1
Total no. of households			148	99
Population if average of 5 persons per household			740	495

Table 5.5: Household and population numbers for FMin (sites with a minimal component value have been assigned a minimum number of households)

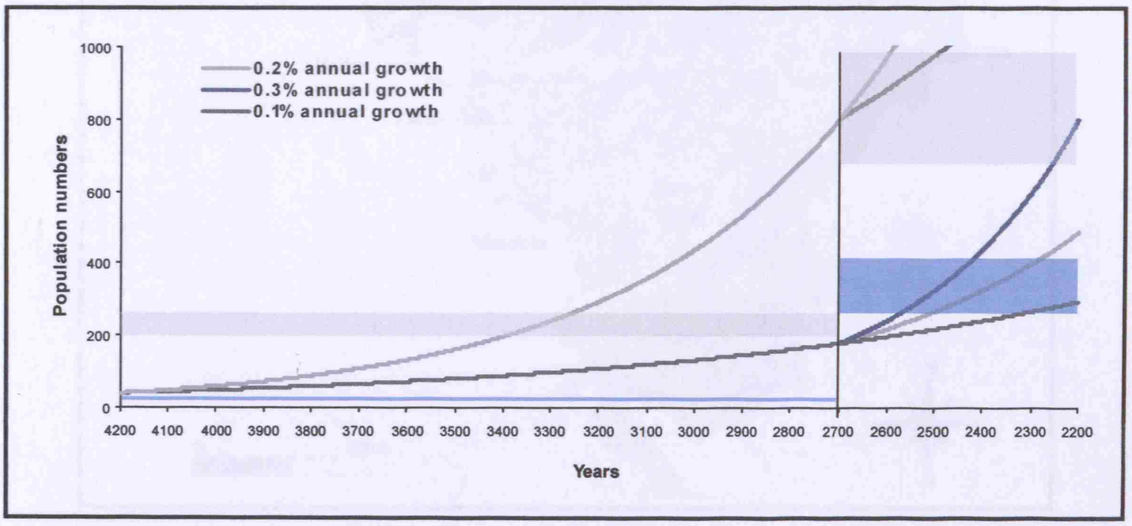


Figure 5.27: Potential population growth for the FN-EB I and EB II on Kythera; un-weighted population estimates shaded in grey and weighted estimates in blue.

Chapter 6

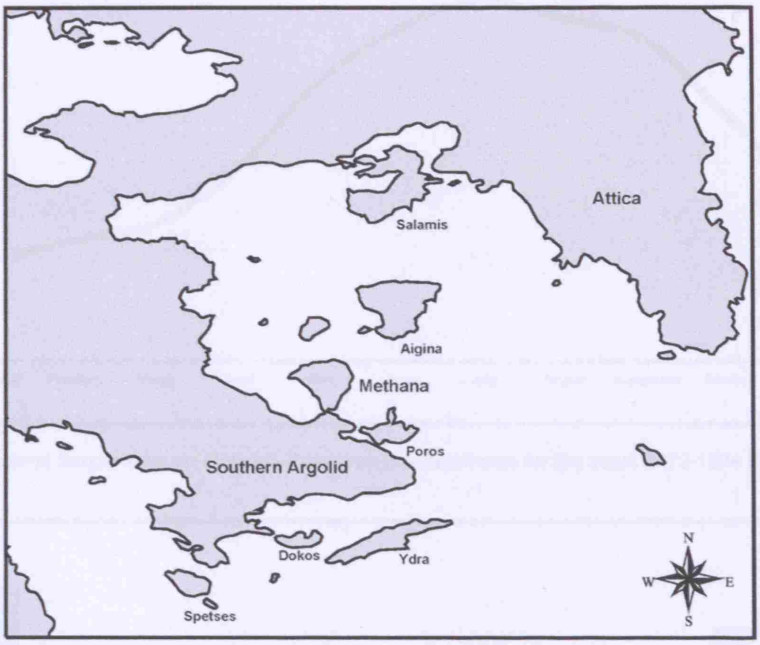


Figure 6.1: Methana in its wider setting

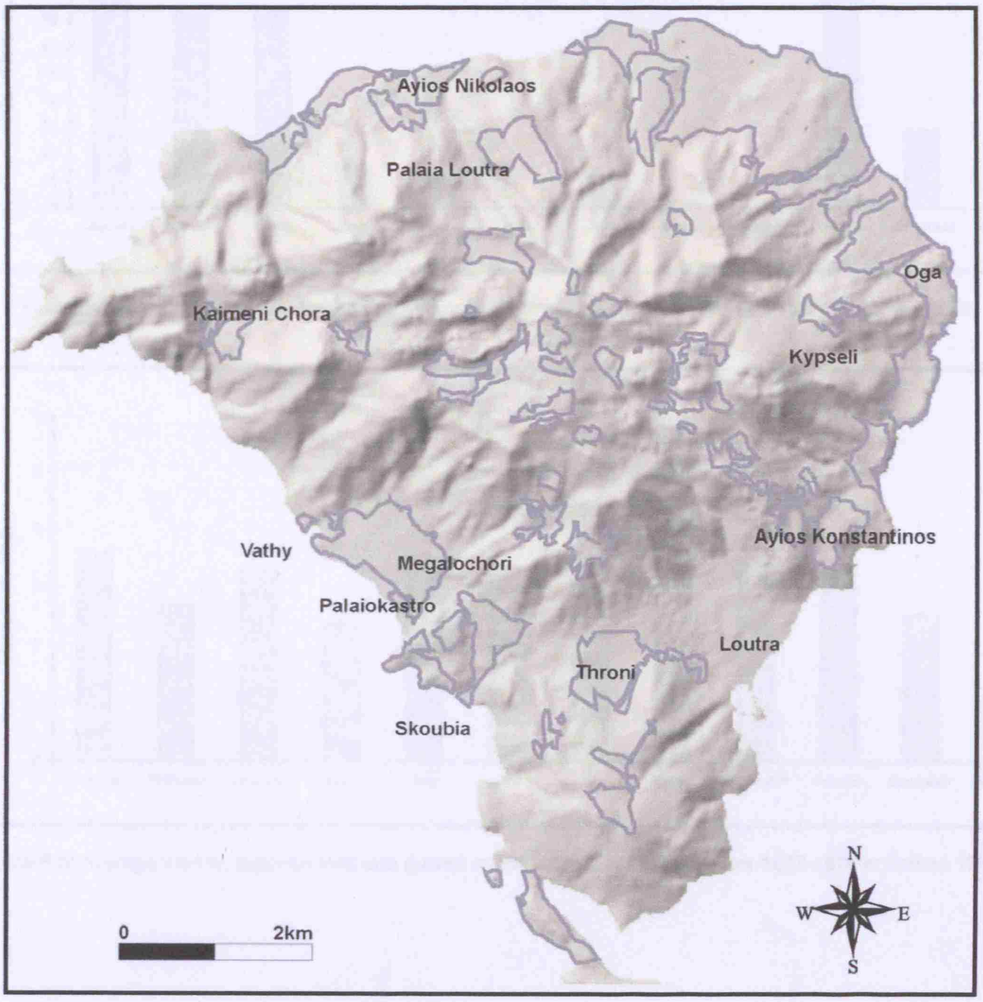


Figure 6.2: Methana with the areas discussed in sections 6.1 and 6.2

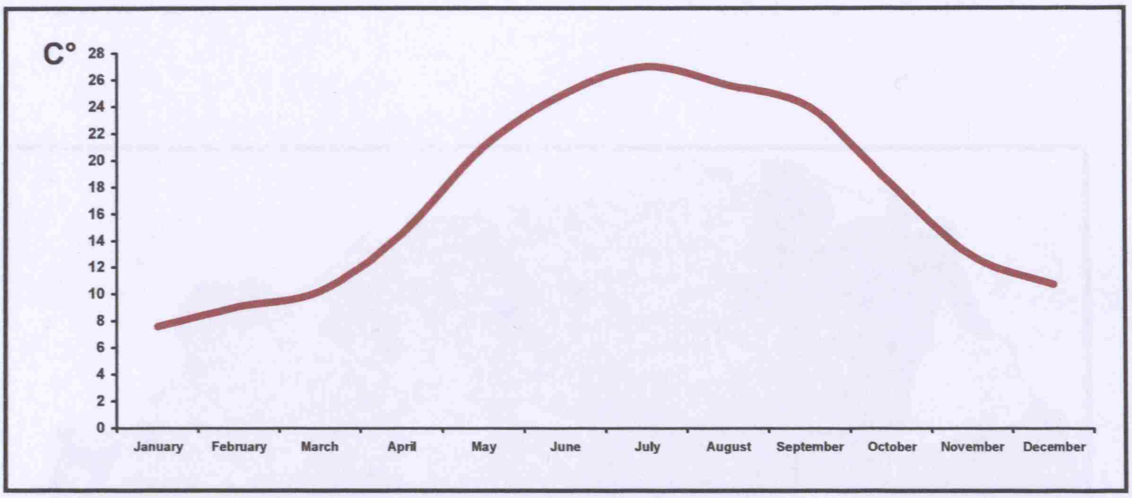


Figure 6.3: Average temperature on Methana (based on measurements for the years 1972-1974 in Forbes 1982)

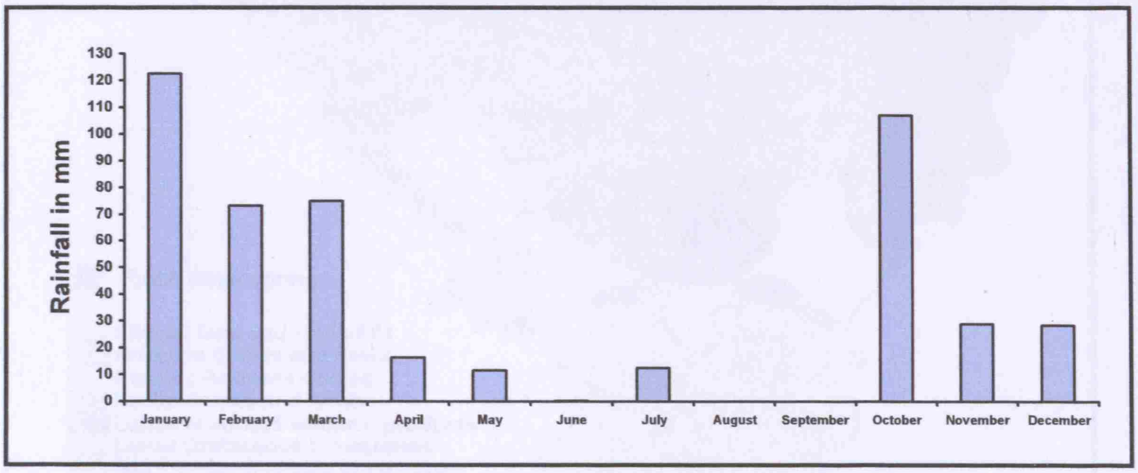


Figure 6.4: Average rainfall on Methana (based on measurements for the years 1972-1974 in Forbes 1982)

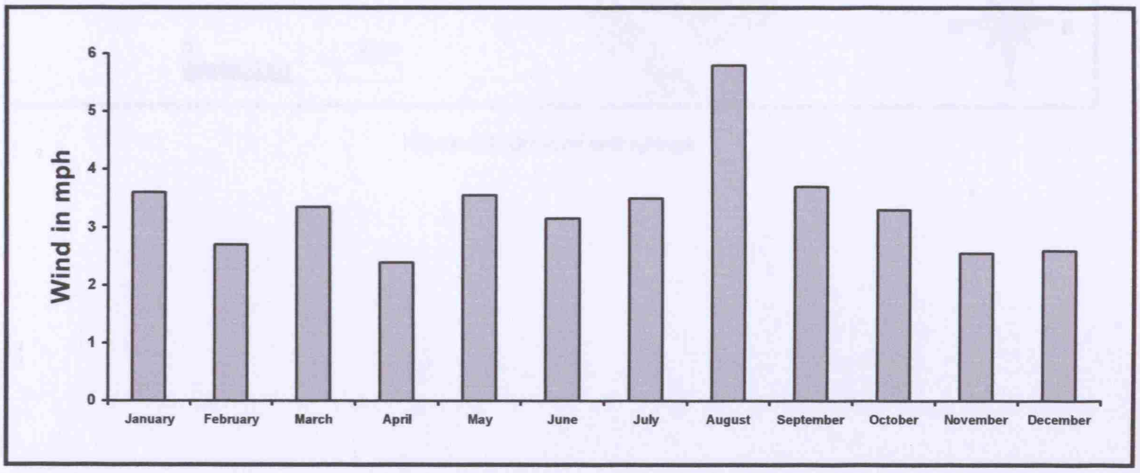


Figure 6.5: Average wind strength on Methana (based on measurements for the years 1972-1974 in Forbes 1982)

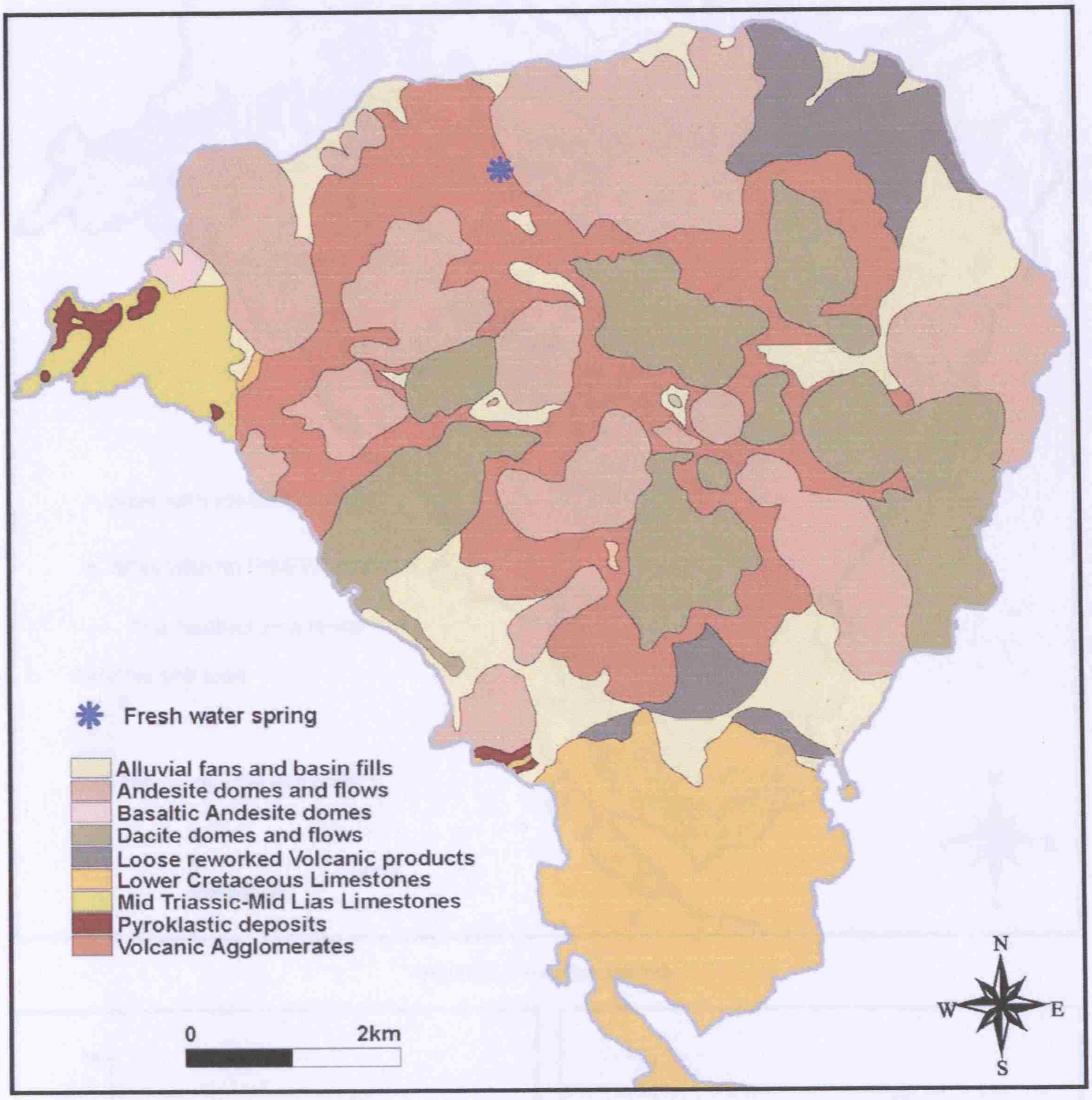


Figure 6.6: Geology and springs

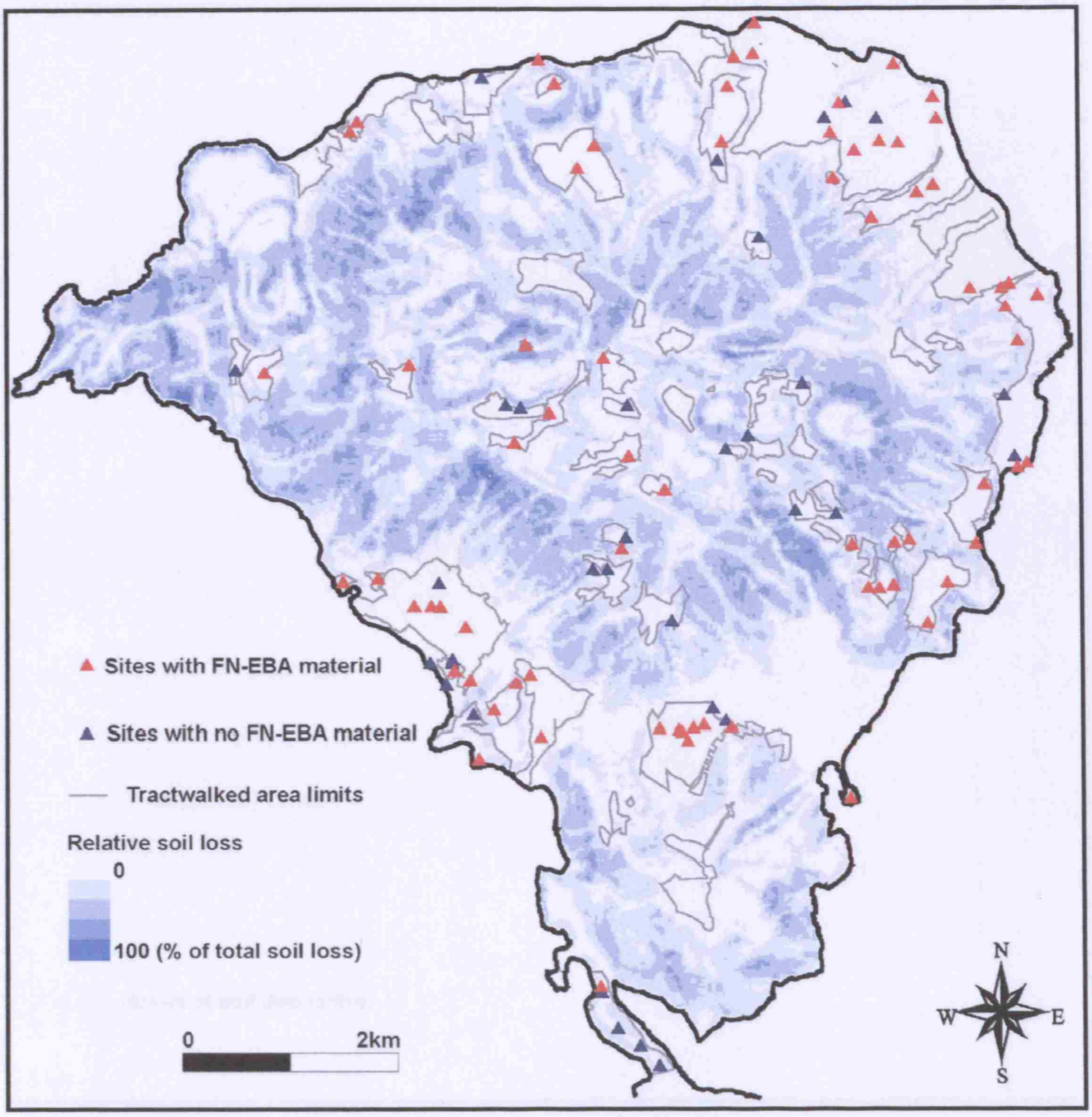
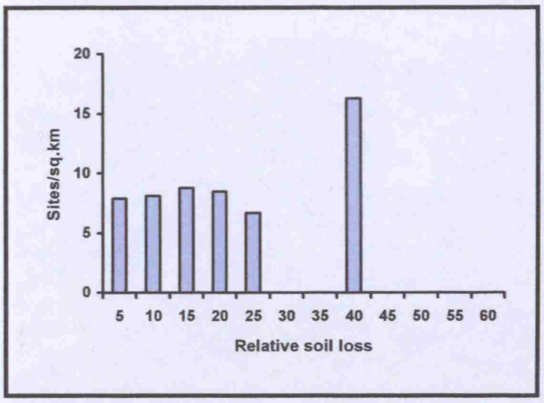
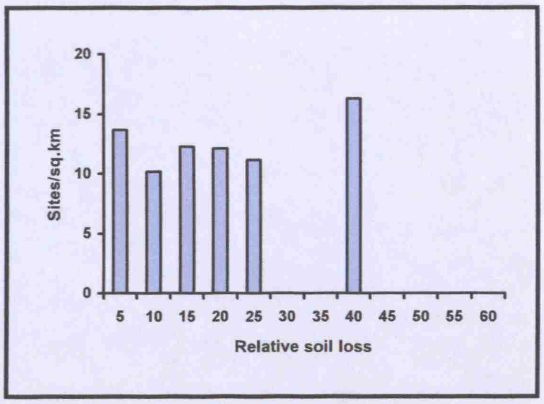


Figure 6.7: Relative soil loss



a) FN-EBA



b) All sites

Figure 6.8: Site densities within the tractwalked area within each relative soil loss category

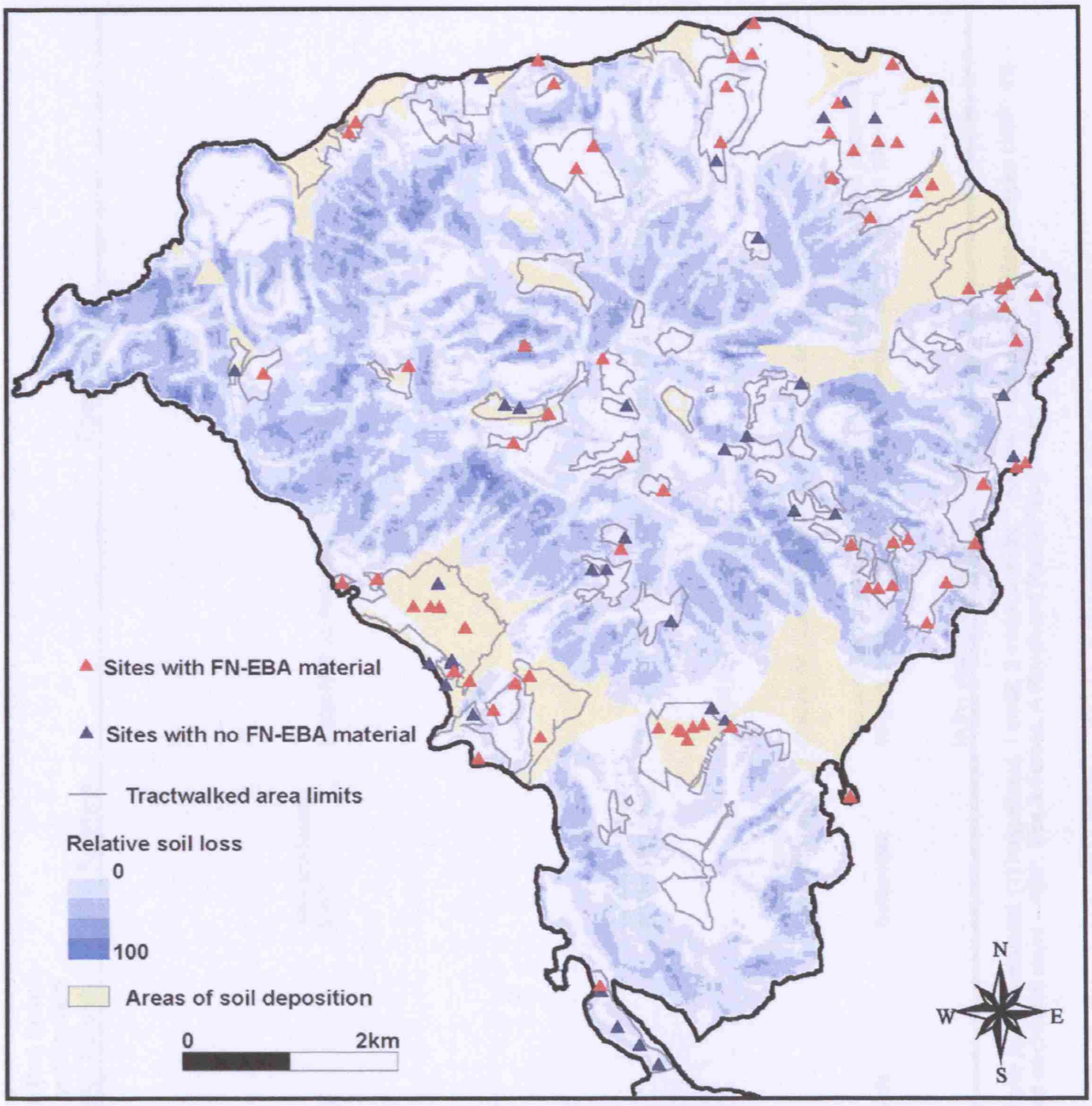


Figure 6.9: Soil deposition areas over relative soil loss

Figure 6.10: Perspective view of Methana highlighting the 3rd century BC eruption (in brown) in the foreground (Google Earth: 2006 Digital Globe/MDA EarthSat)

Site	Location	Component	Pottery counts	Chipped stone counts	Size (ha) based on publication comp 1-3 only	Site function	Comments
001	Plain	FN-EBA: ?	(1)	2	-	-	-
002	Terraces	FN-EBA: ?	None	2	-	-	-
003	Terraces	FN-EB I: x EB II: 1L EB III: x	None	21	1.29	Tool production site?	Material is on alluvium; wash from hills
004	Terraces	FN-EBA: ?	None	3	-	-	-
005	Terraces	FN-EBA: ?	None	1	-	-	-
006	Plain	FN-EBA: ?	None	(13)	-	-	-
007	Terraces	FN-EBA : 1	2	15	0.95	Settlement/ tool production site?	Site is located on alluvium; material cannot be washing from elsewhere
008	Terraces	FN-EB I: (1) EB II: x EB III: x	3	55	1.23	-	Part of 009
009	Terraces	FN-EB I: 2 EB II: x EB III: x	37 (1)	100+	1.6	Settlement/ tool production site?	Cultivation has led to the smearing of the site
010	Hill/ terraces	FN-EB I: 3 EB II: 3 EB III: 3	45 (13)	27	1.1 N-LH	Settlement	The only settlement that covers all FN-EBA phases; On summit, uppermost terrace, ploughed field just N of the acropolis; Previously known site
011	Terraces	FN-EBA : (1)	2	None	-	-	In the vicinity of 060; Off-site material

Table 6.1: Sites with FN-EBA pottery and/or lithics on Methana (Components: ? only possible material; (1) insignificant; 1 small; 2 minor; 3 major; * no other major period in Mee & Taylor (1997: 43) – Artefact counts: () possible material – L: Dating based on chipped stone – RRP: Mee & Forbes, A Rough and Rocky Place, survey publication)

Site	Location	Component	Pottery counts	Chipped stone counts	Size (ha) based on publication comp 1-3 only	Site function	Comments
012*	Knoll	FN-EB I: 3 EB II: x EB III: x	32 (4)	28	0.48 estimate	Settlement	Estimated size should reflect FN-EB I settlement
013	Knoll/ terraces	FN-EB I: 2L EB II: x EB III: x	8 (6)	5	0.64	Settlement	Possibility that site is wash from 012 suggested in RRP
014	Knoll/ terraces	FN-EB I: 2 EB II: x EB III: x	37 (1)	24	0.24 estimate	Settlement	Possibility that site is wash from 008 suggested in RRP
015*	Terraces	FN-EB I: 2L EB II: x EB III: x	9	57	0.16	Settlement/ tool production site?	Material cannot be washing from anywhere else
016	Outcrop/ terraces	FN-EBA : (1)	7	2	0.05	-	Possibility that site is wash from 015 suggested in RRP; Part of 017?
017	Outcrop/ terraces	FN-EBA : 1	9	2	0.20 estimate	Settlement?	Possibility that site is wash from 015 suggested in RRP
018	Outcrop/ terraces	FN-EBA: ?	None	2	-	-	-
020	Terraces	FN-EBA: ?	None	1	-	-	-
025	Outcrop/ terraces	FN-EBA : 2	8 (1)	10	0.39	Settlement?	Possibility that site is wash from elsewhere suggested in RRP (nearest site directly above: 026)
026*	Knoll	FN-EB I: 3 EB II: x EB III: x	18	8	0.13 estimate	Settlement?	Possibility that site is wash from elsewhere or a very eroded site suggested in RRP
027*	Outcrop/ terraces	FN-EB I: x EB II: 1L EB III: x	8	7	0.03 estimate	Settlement/ tool production site?	-

Table 6.1 continued

Site	Location	Component	Pottery counts	Chipped stone counts	Size (ha) based on publication comp 1-3 only	Site function	Comments
028*	Outcrop/ terraces	FN-EB I: 3 EB II: x EB III: x	16	66	0.14	Settlement/ tool production site?	-
029	Outcrop	FN-EB I: 1 EB II: x EB III: x	2 (1)	6	0.13 estimate	?	Possibility that site is wash from elsewhere suggested in RRP-limited surrounding area fieldwalked
052	Terraces	FN-EBA : (1)	1	1	-	-	In the vicinity of 009; Off-site material
053	Outcrop/ terraces	FN-EB I: 1 EB II: x EB III: x	2	45	0.11	Settlement/ tool production site?	-
054	Terraces	FN-EB I: 1 EB II: 1L EB III: x	4	73	0.4 estimate	Settlement/ tool production site?	More likely a tool site? FN-EBA probably disturbed by later phases
055B	Knoll/ terraces	FN-EBA : (1)	4	8	0.3 estimate	-	Part of 055C
055C*	Knoll	FN-EBA : 3	16	6	0.2 estimate	Settlement?	-
056	Terraces	FN-EBA: ?	(2)	5	-	-	-
057	Terraces	FN-EBA : (1)	2	4	-	-	In the vicinity of 058 and below 112; Off-site material
058*	Terraces	FN-EBA : 1	3	6	?	?	Possibility that site is wash from 112 suggested in RRP
060	Hill	FN-EB I: 1 EB II: x EB III: x	4 (1)	5	1.8	?	Only 011 in the vicinity

Table 6.1 continued

Site	Location	Component	Pottery counts	Chipped stone counts	Size (ha) based on publication comp 1-3 only	Site function	Comments
061*	Knoll/ terraces	FN-EB I: 3L EB II: 3L EB III: x	22	34	0.29	Settlement	Intensive collection at a later stage produced 384 EBA sherds (James *et al.* 1994)
062	Terraces	FN-EBA : ?	None	2	-	-	-
063*	Terraces	FN-EBA : (1)	2	23	MS64	-	Part of 64
064*	Terraces	FN-EB I: 3L EB II: x EB III: x	25 (9)	100+	0.3 estimate	Settlement	It is suggested in RRP that part of the site has been eroded by sea
067	Hill	FN-EB I: 3 EB II: 3 EB III: x	55 (8)	68	1.54	Settlement	FN-EBA was limited to the acropolis, the lower acropolis, and the west terraces; Previously known site
068	Terraces	FN-EB I: x EB II: 1 EB III: x	8 (1)	7	0.03	Settlement?	Possibility that site is wash from 067 suggested in RRP
069	Terraces	FN-EBA : 1	3+	?	0.012	?	Primarily a R settlement; FN-EBA material identified on a terrace below an unexplored cave (James *et al.* 1994)
071	Terraces	FN-EB I: 3L EB II: x EB III: x	15 (2)	16	0.11	Settlement?	Highest density is on terraces not on hill summit
072	Terraces	FN-EBA : (1)	2 (1)	2	-	-	Off-site material
075	Plateau	FN-EBA : (1)	1	None	-	-	Off-site material
100	Terraces	FN-EBA : (1)	1	None	-	-	Off-site material

Table 6.1 continued

Site	Location	Component	Pottery counts	Chipped stone counts	Size (ha) based on publication comp 1-3 only	Site function	Comments
101	Terraces	FN-EBA : (1)	2	None	-	-	In the vicinity of 112; Off-site material
102	Terraces	FN-EBA: ?	(2)	3	-	-	-
103	Outcrop-island	FN-EB I: 3 EB II: 3 EB III: x	89 (10)	10	0.48	Settlement	Previously known site
104*	Ridge/ terraces	FN-EB I: 3 EB II: x EB III: x	7+ (3)	23	0.06	Settlement	Possibility that site is wash from 108 suggested in RRP
105*	Ridge/ terraces	FN-EB I: 3 EB II: x EB III: x	11 (3)	37	1.01	Settlement	Additional spill from 106 and 108 suggested in RRP
106	Ridge/ terraces	FN-EB I: 2 EB II: 2 EB III: x	10 (5)	3	0.07	Settlement	Possibility that site is wash from 108 suggested in RRP
107*	Outcrop/ terraces	FN-EB I: 3 EB II: x EB III: x	21 (3)	12	0.03	Settlement	Possibility that site is wash from 108 suggested in RRP
108	Ridge/ Terraces	FN-EB I: 3 EB II: 2 EB III: x	168 (12)	41	1.04	Settlement	-
111	No info	FN-EBA : (1)	SEE 219	SEE 219	SEE 219	SEE 219	Part of 219
112	Terraces	FN-EB I: 3 EB II: x EB III: x	56 (3)	11	0.13	Settlement	-
117	Terraces	FN-EBA : 2	7 (2)	2	0.10 estimate	Settlement?	Possibility that site is on knoll nearby suggested in RRP

Table 6.1 continued

Site	Location	Component	Pottery counts	Chipped stone counts	Size (ha) based on publication comp 1-3 only	Site function	Comments
118	Terraces	FN-EBA : 1	3	None	0.13	?	Very little material, but unlikely to be coming from elsewhere
119	Mountain peak	FN-EBA : (1)	1	1	-	-	Off-site material
120	Terraces	FN-EBA: ?	None	5	-	-	-
121	Terraces	FN-EBA: ?	(1)	3	-	-	-
124	Plateau	FN-EB I: 3 EB II: 3 EB III: x	47 (17)	39	1.5	Settlement	Used to be a promontory (suggested in RRP)
204	Hill	FN-EB I: 2 EB II: x EB III: x	10	2	0.18	Settlement	FN-EBA is on the hilltop
205*	Terraces	FN-EBA : 3	9 (1)	39	0.03	Settlement/ tool production site?	Possibility that site is wash from 206 suggested in RRP
206*	Terraces	FN-EB I: 3 EB II: x EB III: x	21	17	0.06	Settlement	-
207	Terraces	FN-EB I: 1L EB II: x EB III: x	4+	9	0.20	Settlement?	Possibility that site is wash from 206 suggested in RRP
208*	Terraces	FN-EBA : 1	3	1	0.03	?	Possibility that site is wash from 206 suggested in RRP
209	Knoll/ terraces	FN-EBA : ?	None	1	-	-	-

Table 6.1 continued

Site	Location	Component	Pottery counts	Chipped stone counts	Size (ha) based on publication comp 1-3 only	Site function	Comments
210	Knoll	FN-EBA : ?	(1)	None	-	-	-
212	Knoll/ terraces	FN-EBA : 1	1 (1)	15	0.06	Settlement/ tool production site?	Possibility that site is wash from 111/219 suggested in RRP
213	Terraces	FN-EB I: 2 EB II: x EB III: x	5+ (2)	5	0.14	Settlement?	Possibility that site is wash from upslope suggested in RRP
215	Ridge	FN-EBA : ?	None	1	-	-	-
219*	Terraces	FN-EB I: 3 EB II: 1L EB III: x	39 (3)	50	0.4 estimate	Settlement	Heavily eroded
220	Terraces	FN-EBA : 1	22+	?	0.15	?	Primarily classical site; FN-EBA identified but assumed to have been introduced; more numerous on volcanic than on limestone; site is in Throni off edge of alluvium (James *et al.* 1994)
220	Terraces	FN-EBA : 1	22+	?	0.15	?	Primarily classical site; FN-EBA identified but assumed to have been introduced; more numerous on volcanic than on limestone; site is in Throni off edge of alluvium (James *et al.* 1994)

Table 6.1 continued

SITES	FN-EB I	EB II	EB III	FN-EBA	Comments
001	-	-	-	? sherds/obsidian	
002	-	-	-	? obsidian	
003	-	1L obsidian	-	-	
004	-	-	-	? obsidian	
005	-	-	-	? obsidian	
006	-	-	-	? lithics	
007	-	-	-	1 sherds/obsidian	
008	(1) sherds/obsidian	-	-	-	part of 009
009	2 sherds/obsidian	-	-	-	
010	3 sherds/obsidian	3 sherds/obsidian	3 sherds/obsidian	-	
011	-	-	-	(1) sherds	
012	3 sherds/obsidian	-	-	-	
013	2L sherds/obsidian	-	-	-	
014	2 sherds/obsidian	-	-	-	
015	2L sherds/obsidian	-	-	-	
016	-	-	-	(1) sherds/obsidian	part of 017
017	-	-	-	1 sherds/obsidian	
018	-	-	-	? obsidian	
020	-	-	-	? obsidian	
025	-	-	-	2 sherds/obsidian	
026	3 sherds/obsidian	-	-	-	
027	-	1L sherds/obsidian	-	-	
028	3 sherds/obsidian	-	-	-	
029	1 sherds/obsidian	-	-	-	
052	-	-	-	(1) sherds/obsidian	
053	1 sherds/obsidian	-	-	-	
054	1 sherds/obsidian	1L sherds/obsidian	-	-	
055b	-	-	-	(1) sherds/obsidian	part of 055c
055c	-	-	-	3 sherds/obsidian	
056	-	-	-	? sherds/obsidian	
057	-	-	-	(1) sherds/obsidian	
058	-	-	-	1 sherds/obsidian	
060	1 sherds/obsidian	-	-	-	
061	3L sherds/obsidian	3L sherds/obsidian	-	-	
062	-	-	-	? obsidian	
063	-	-	-	(1) sherds/obsidian	part of 064
064	3L sherds/obsidian	-	-	-	
067	3 sherds/obsidian	3 sherds/obsidian	-	-	
068	-	1 sherds/obsidian	-	-	
069	-	-	-	1 sherds	
071	3L sherds/obsidian	-	-	-	
072	-	-	-	(1) sherds/obsidian	
075	-	-	-	(1) sherds	
100	-	-	-	(1) sherds	
101	-	-	-	(1) sherds	
102	-	-	-	? sherds/obsidian	
103	3 sherds/obsidian	3 sherds/obsidian	-	-	

Table 6.2: Sites with FN-EBA pottery and/or lithics on Methana (Components: ? only possible material; (1) insignificant; 1 small ; 2 minor; 3 major – L: Dating based on chipped stone)

SITES	FN-EB I	EB II	EB III	FN-EBA	Comments
104	3 sherds/obsidian	-	-	-	
105	3 sherds/obsidian	-	-	-	
106	2 sherds/obsidian	2 sherds/obsidian	-	-	
107	3 sherds/obsidian	-	-	-	
108	3 sherds/obsidian	2 sherds/obsidian	-	-	
111	see 219	see 219	see 219	see 219	part of 219
112	3 sherds/obsidian	-	-	-	
117	-	-	-	2 sherds/obsidian	
118	-	-	-	1 sherds	
119	-	-	-	(1) sherds	
120	-	-	-	? lithics	
121	-	-	-	? sherds/obsidian	
124	3 sherds/obsidian	3 sherds/obsidian	-	-	
204	2 sherds/obsidian	-	-	-	
205	-	-	-	3 sherds/obsidian	
206	3 sherds/obsidian	-	-	-	
207	1L sherds/obsidian	-	-	-	
208	-	-	-	1 sherds/obsidian	
209	-	-	-	? obsidian	
210	-	-	-	? sherds	
212		-	-	1 sherds/obsidian	
213	2 sherds/obsidian	-	-	-	
215	-	-	-	? obsidian	
219	3 sherds/obsidian	1L sherds/obsidian	-	-	
220	-	-	-	1 sherds	

Table 6.2 continued

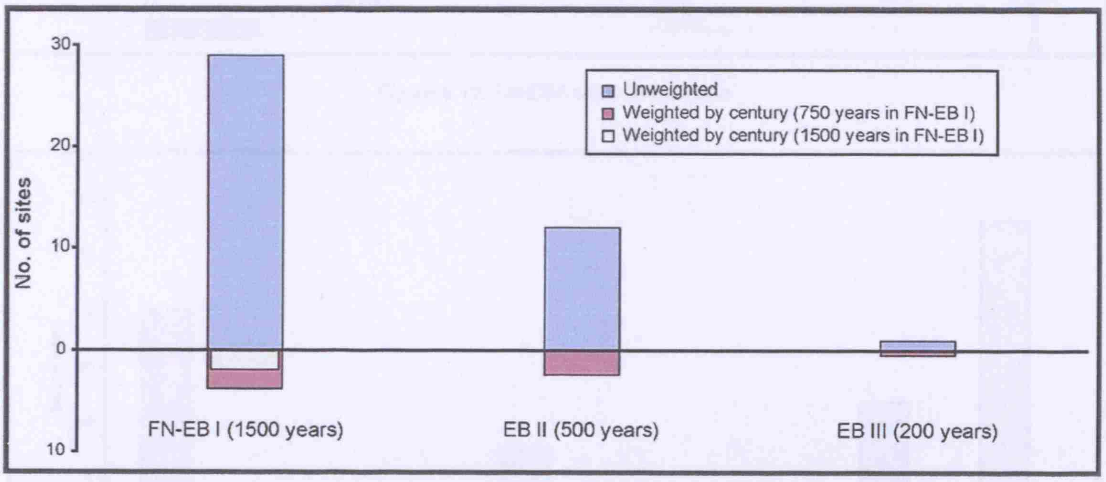


Figure 6.11: Number of sites within each FN-EBA phase (components 1-3)

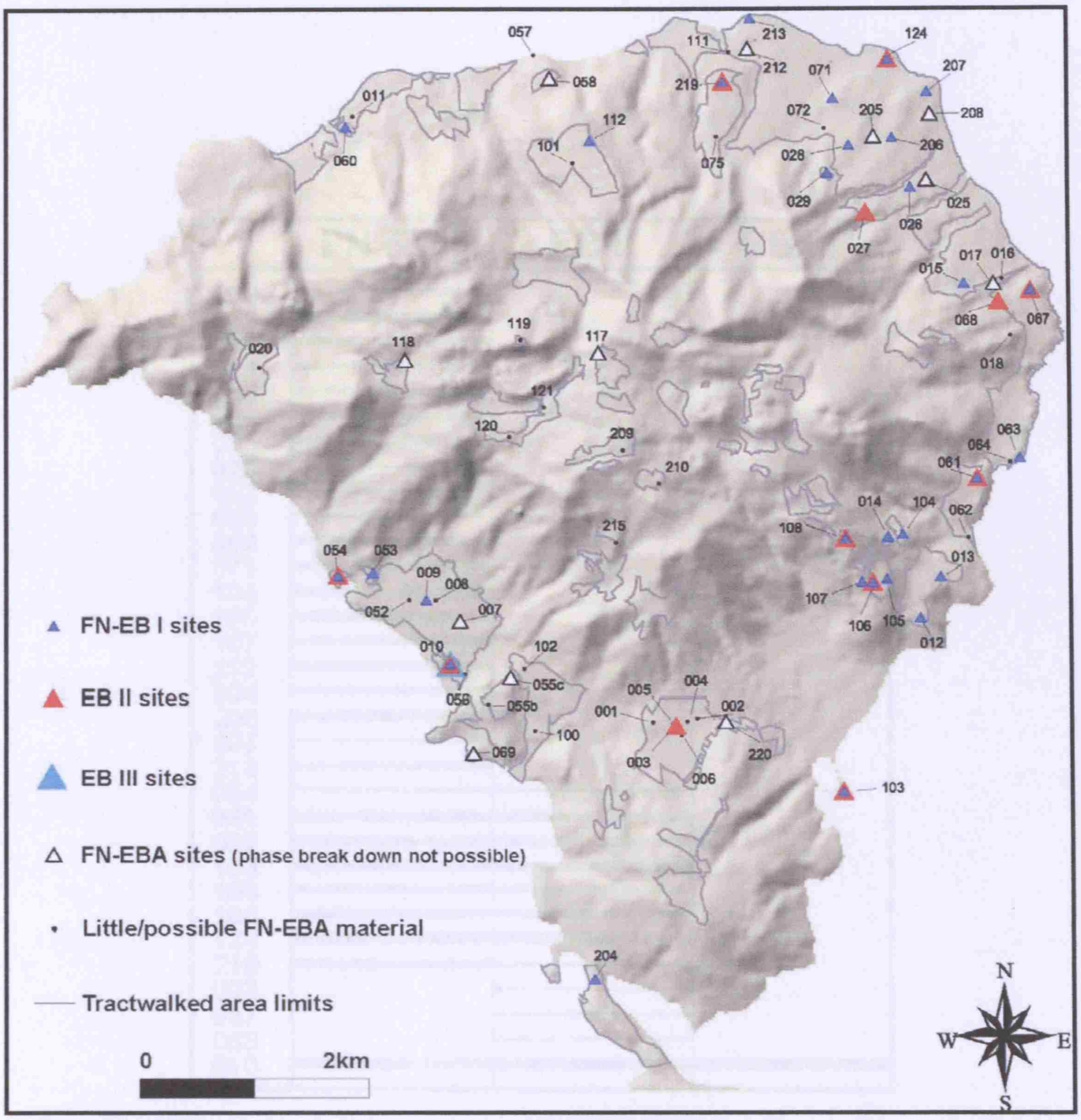


Figure 6.12: FN-EBA sites on Methana

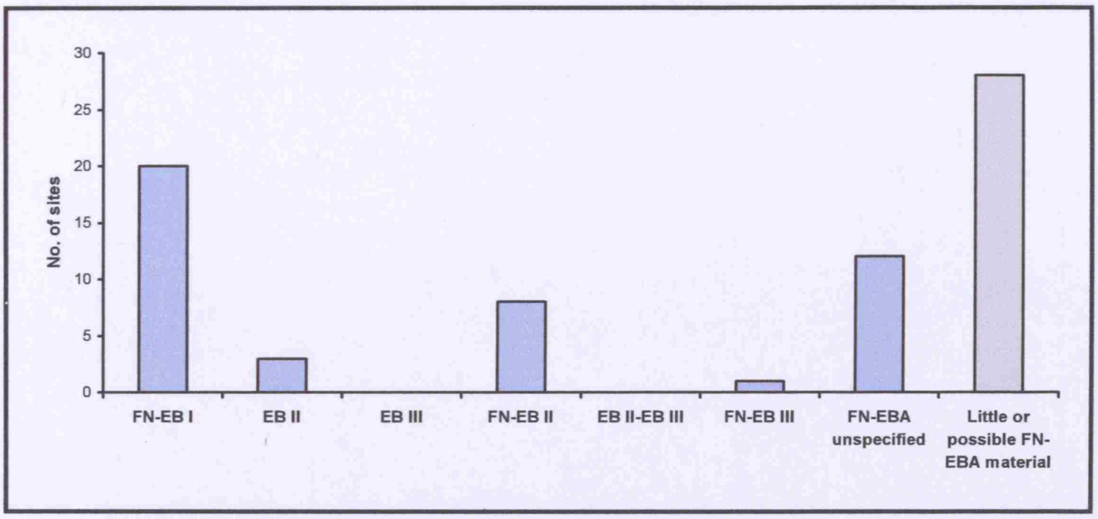


Figure 6.13: Sites on Methana grouped according to the number of FN-EBA phases they cover

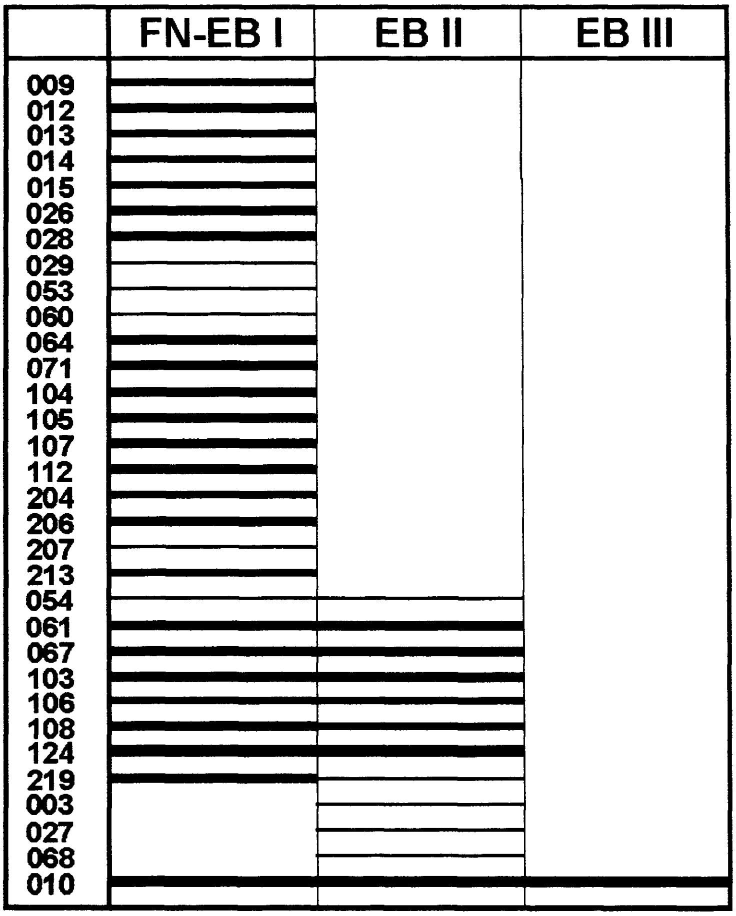


Figure 6.14: Sites on Methana in each phase (components 1-3 – line thickness indicates component; dashed line indicates insignificant material)

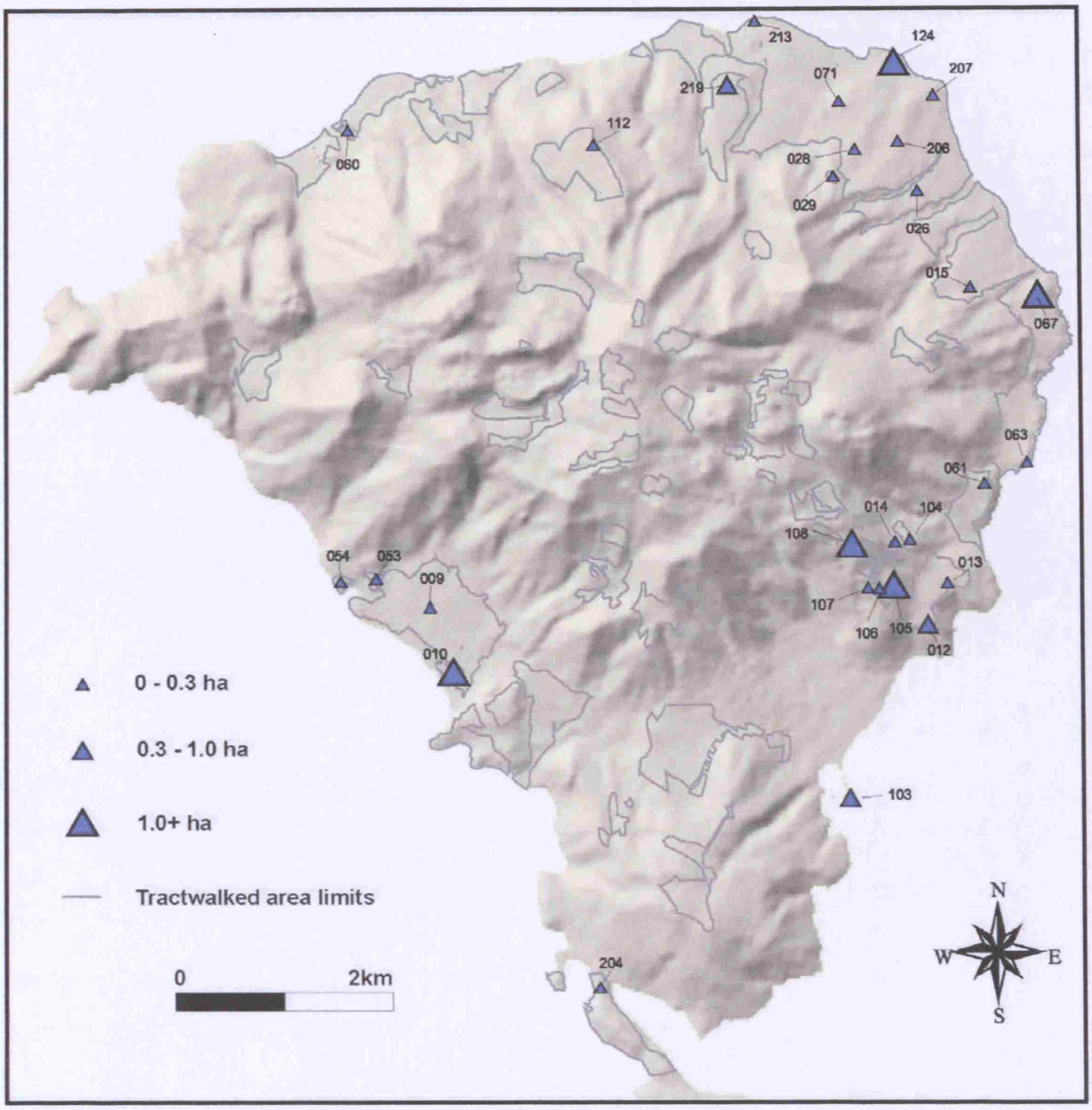


Figure 6.15: Site size on FN-EB I Methana

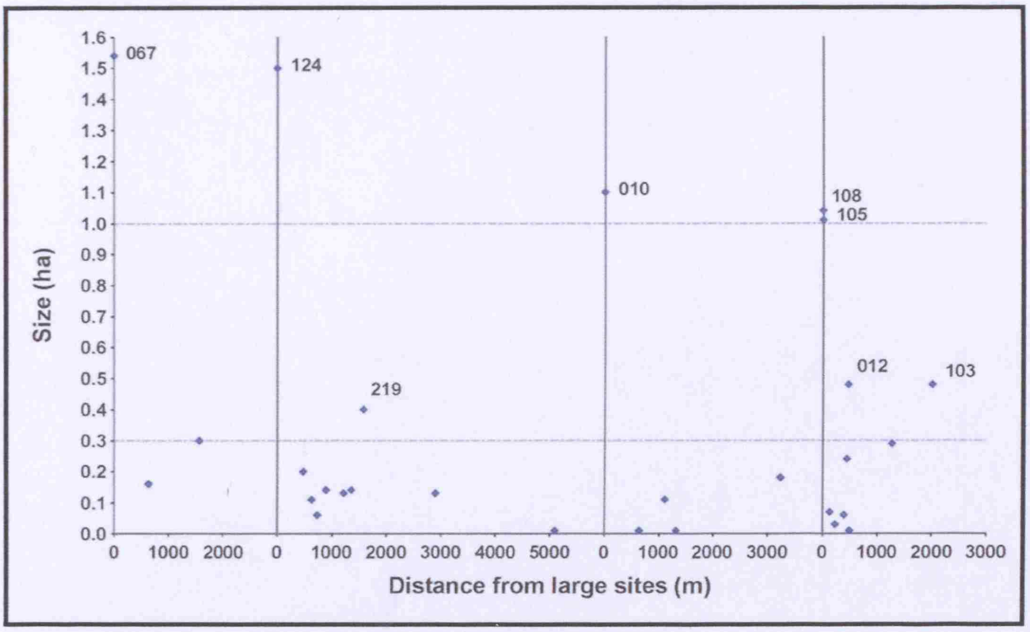


Figure 6.16 FN-EB I site size and distance to closest 1ha+ site

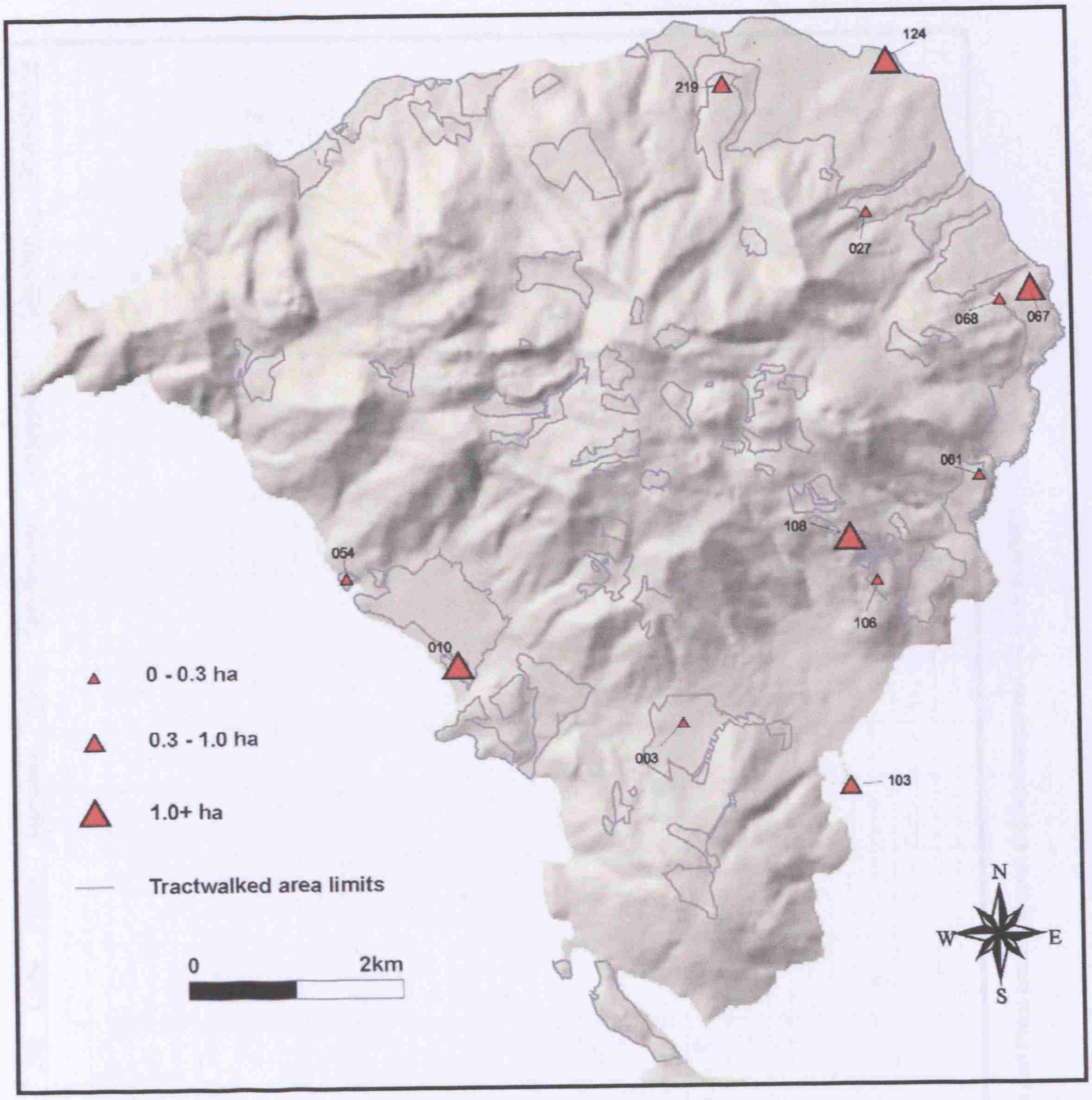
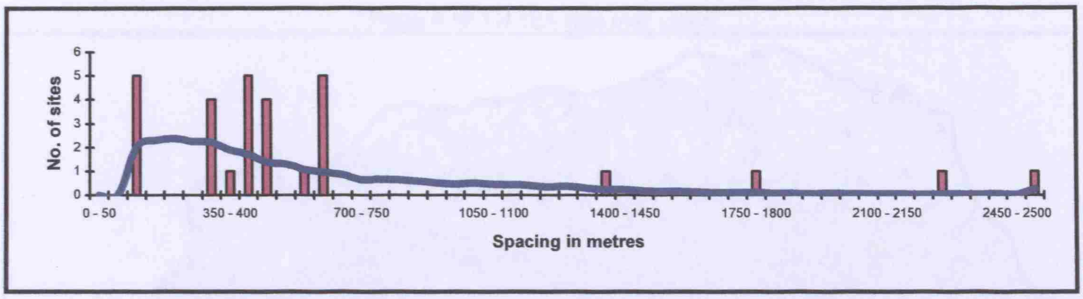


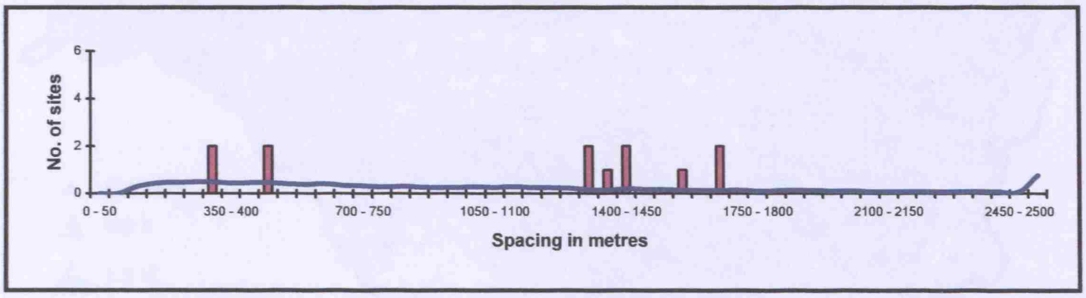
Figure 6.17: Site size on EB II Methana

SITES	O	C	Askos	Basin	Bowl	Chytra	Frying pan	Jar	Jug	Ladle	Pithos	Sauceboat	Sieve	Spindlewhorl	Loomweight	Obsidian	Groundstone
003																x	
007	x															x	
008/009	x				x											x	
010	x	x	(x)	x	x			x				x				x	
012	x	x	(x)	x	x								x			x	
013	x				x			x								x	
014	x	x		x	x											x	
015																x	
016/017	x															x	
025					x											x	
026	x															x	x
027	x															x	
028	x				x											x	
029																x	
053	x												x			x	
054	x															x	
055b/c	x															x	
058	x				x											x	
060	x				x											x	
061	x			x	x						x					x	
063/64	x				(x)											x	
067	x	x		x	x		(x)	x					x	x		x	
068	x				x											x	
069																	
071	x	x	(x)													x	
103	x	x	(x)	x	x		x	x	x		x		x		x	x	
104	x												x			x	
105	x		(x)		x						x		x			x	
106	x											(x)				x	
107	x	x											x			x	
108	x	x	(x)	x	x	x		x	x	(x)	x		x			x	x
112	x	x		x	x								x			x	
117	x	x														x	
118	x																
124	x	x		x	x		(x)				x	x				x	x
204	x	x					(x)				x					x	
205	x										x					x	
206	x	x											x			x	x
207	x															x	x
208	x															x	
212	x															x	
213	x															x	
219	x	x			x											x	
220																	

Table 6.3: Pottery shapes and lithics present at each site with component 1-3 (( ) = possible)



a) FN-EB I



b) EB II

Figure 6.18: Spacing of sites within the survey area

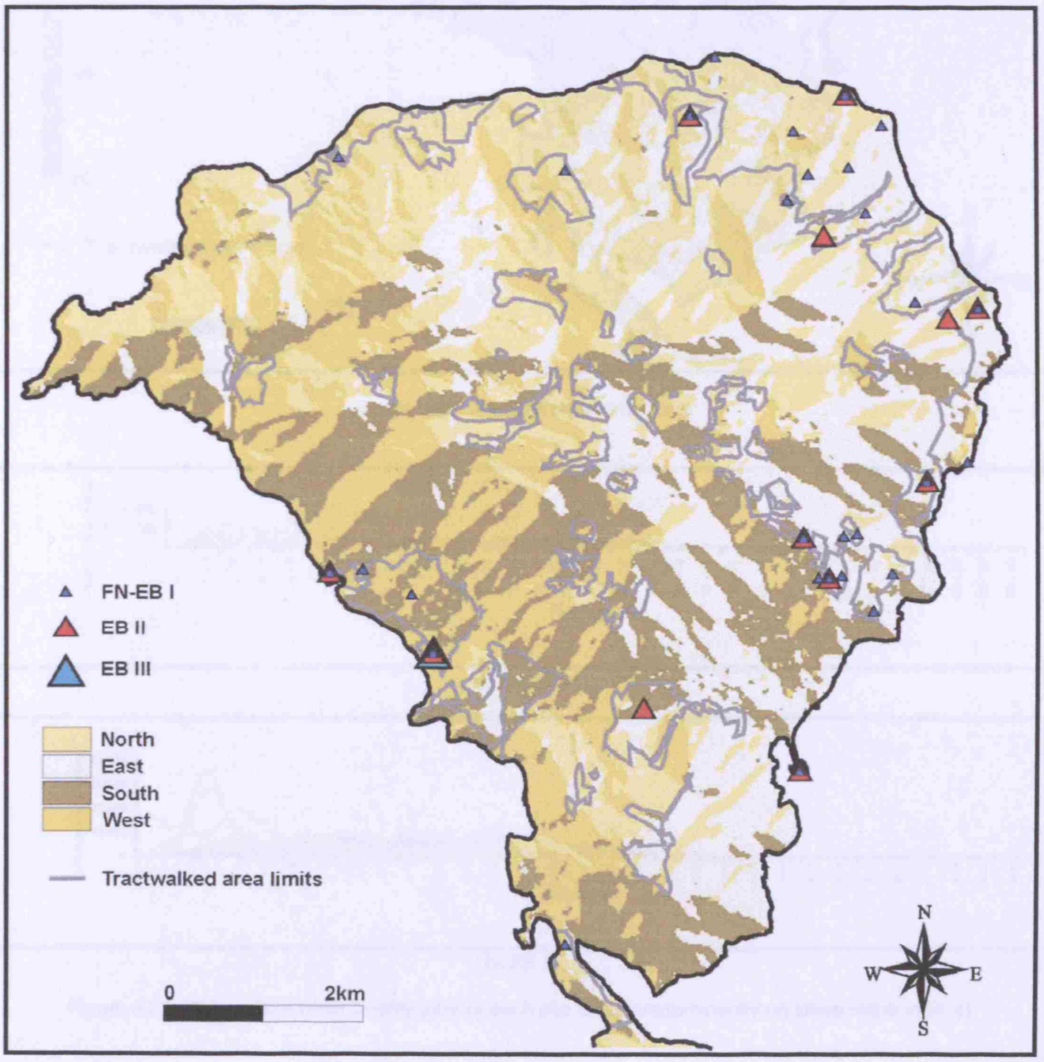


Figure 6.19: FN-EBA sites over aspect

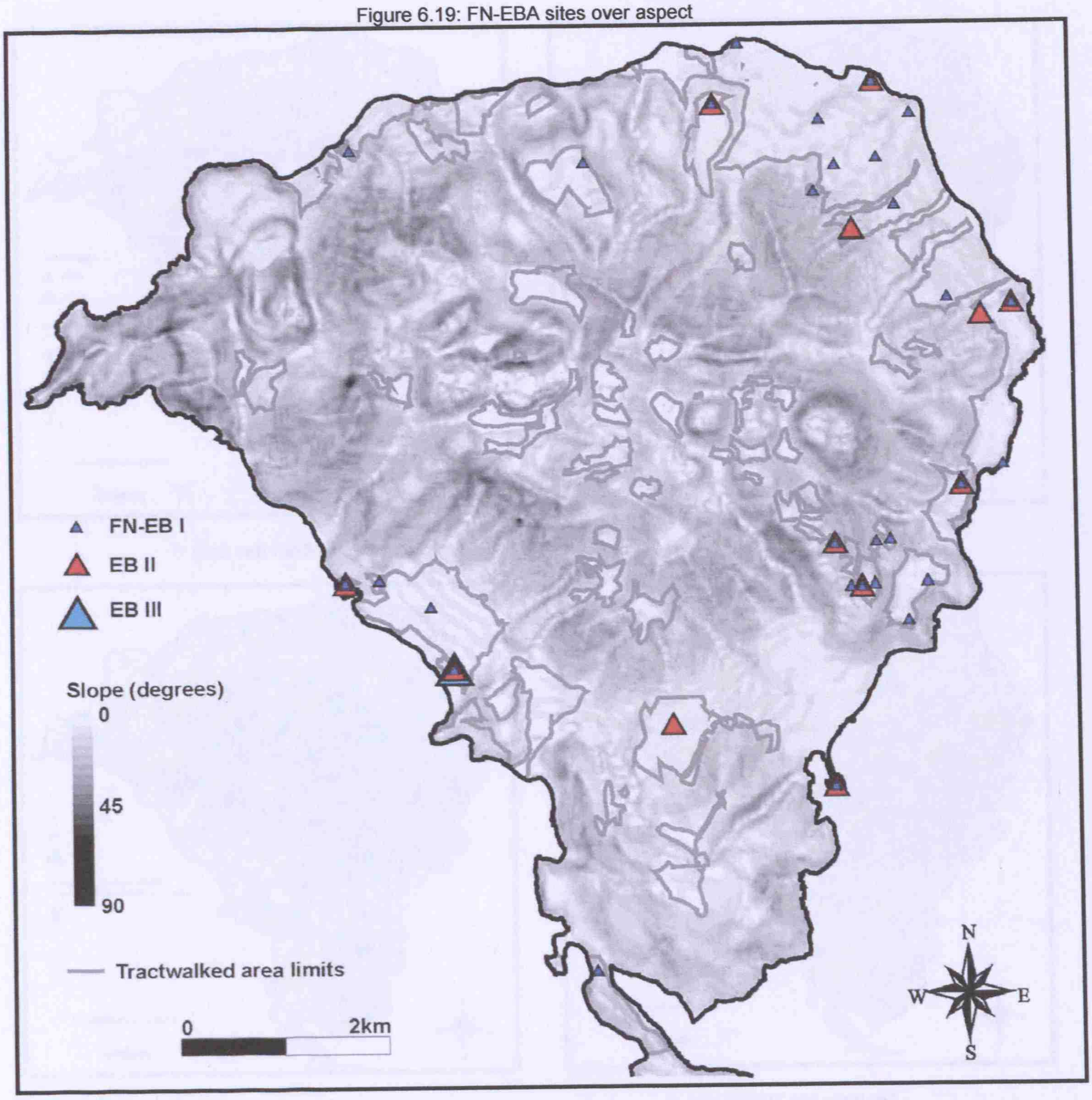
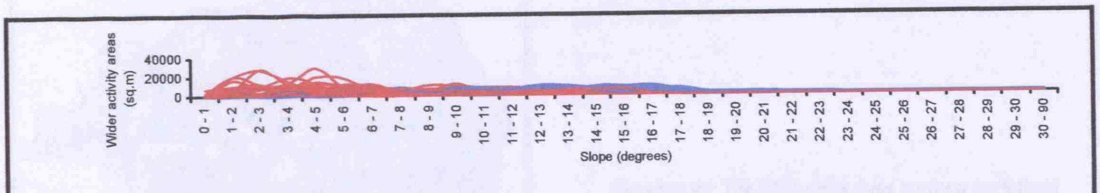
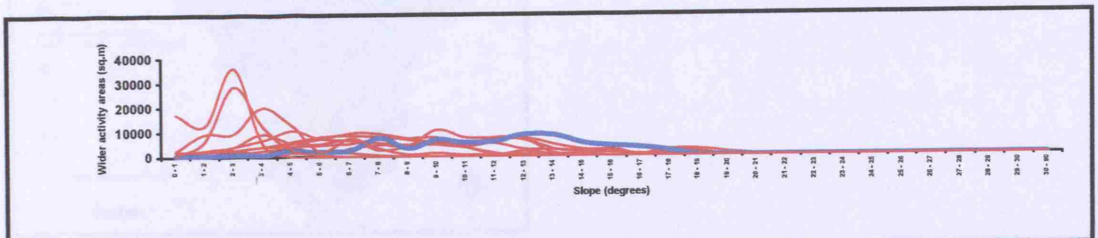


Figure 6.20: FN-EBA sites over slope

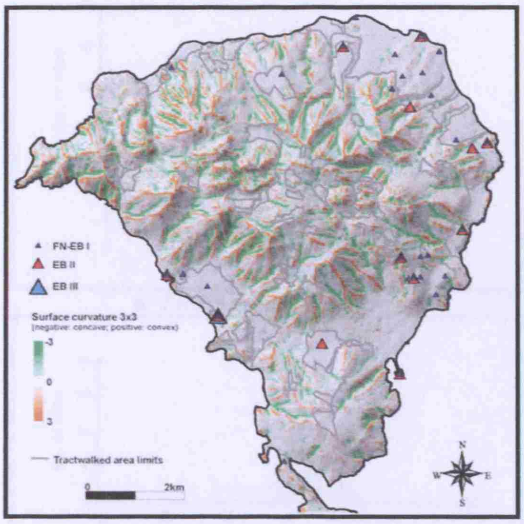


a) FN-EB I

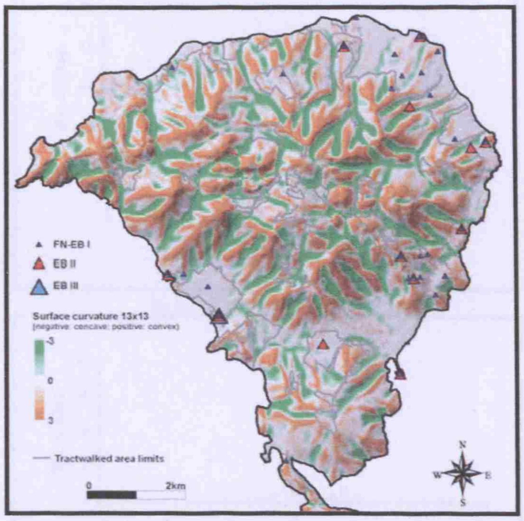


b) EB II

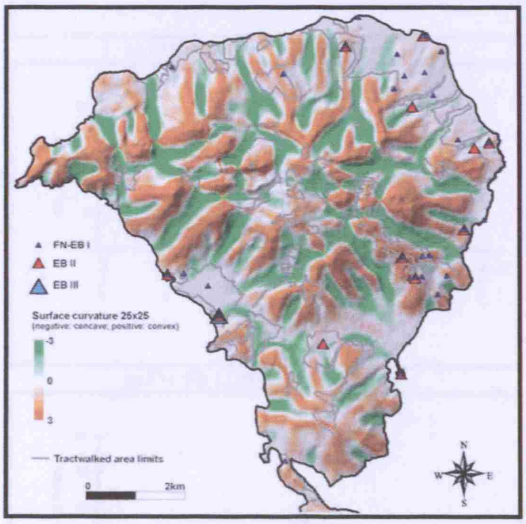
Figure 6.21: Slope within wider activity area of each site (sites predominantly on steep slope in blue)



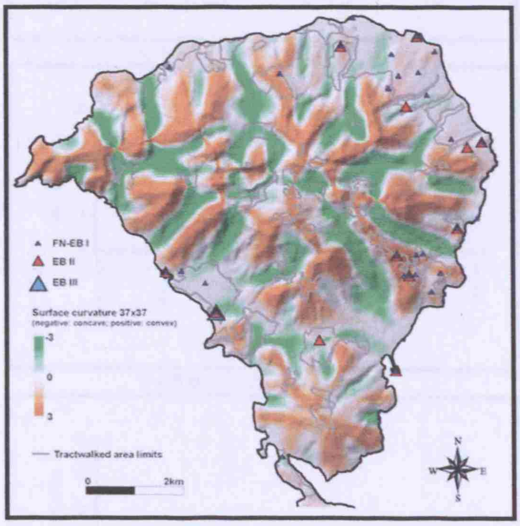
(3x3 cell window)



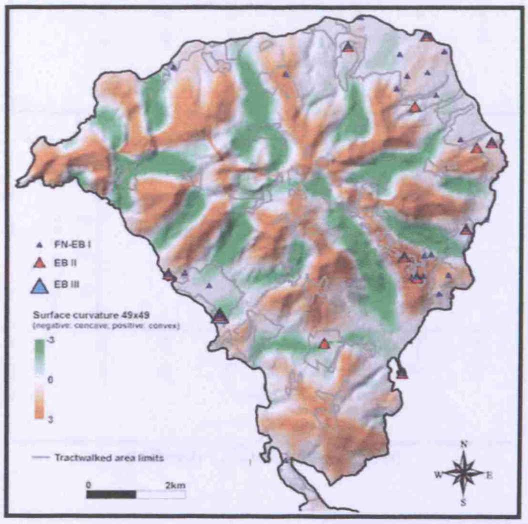
(13x13 cell window)



(25x25 cell window)

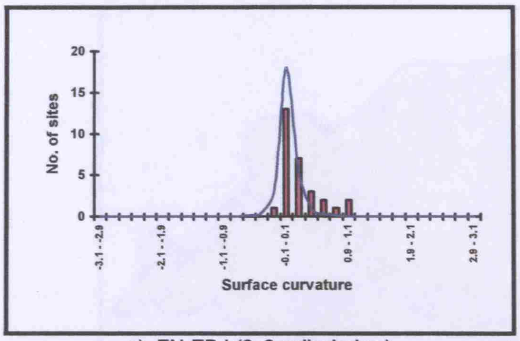


(37x37 cell window)

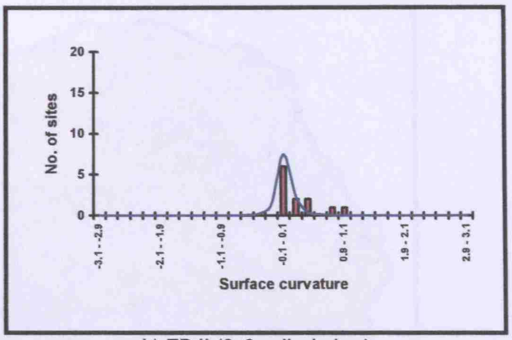


(49x49 cell window)

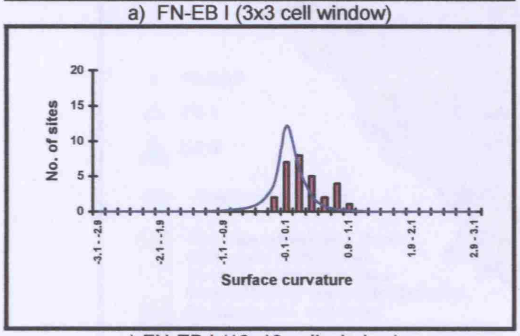
Figure.6.22: FN-EBA sites over surface curvature



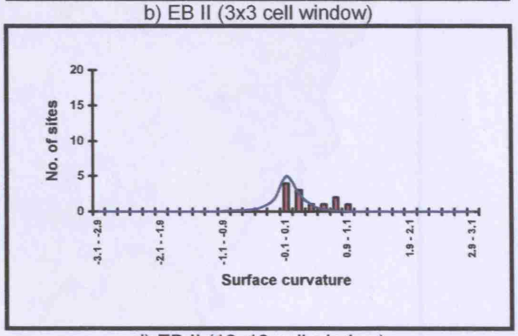
a) FN-EB I (3x3 cell window)



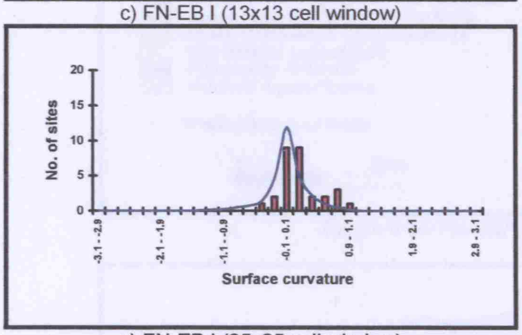
b) EB II (3x3 cell window)



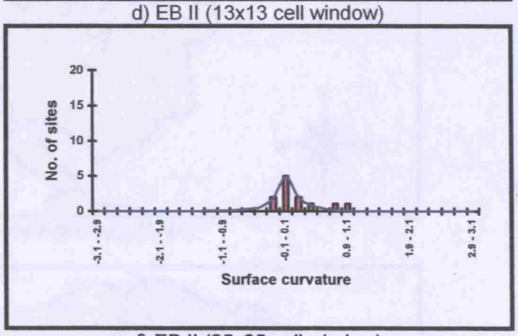
c) FN-EB I (13x13 cell window)



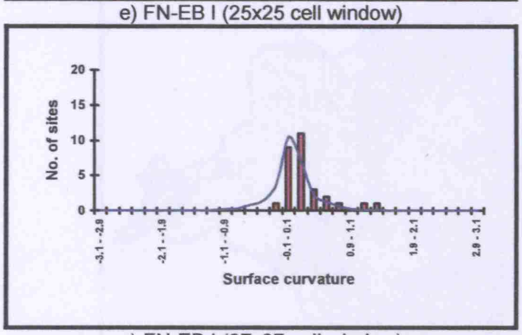
d) EB II (13x13 cell window)



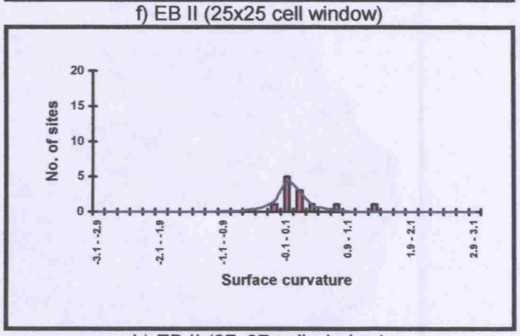
e) FN-EB I (25x25 cell window)



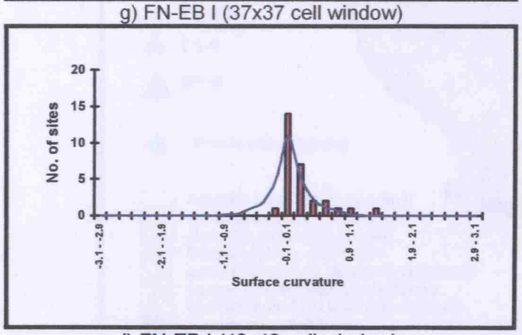
f) EB II (25x25 cell window)



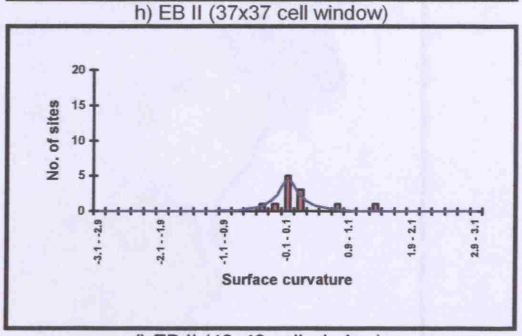
g) FN-EB I (37x37 cell window)



h) EB II (37x37 cell window)



i) FN-EB I (49x49 cell window)



j) EB II (49x49 cell window)

Figure 6.23: FN-EBA sites and surface curvature

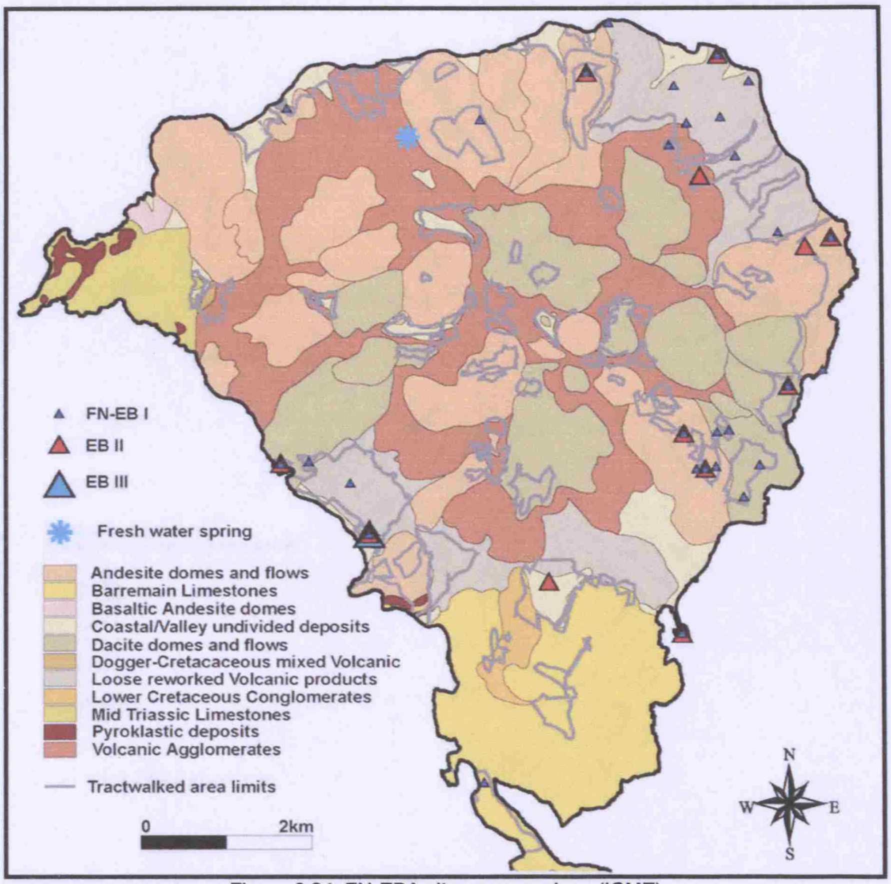


Figure 6.24: FN-EBA sites over geology (IGME)

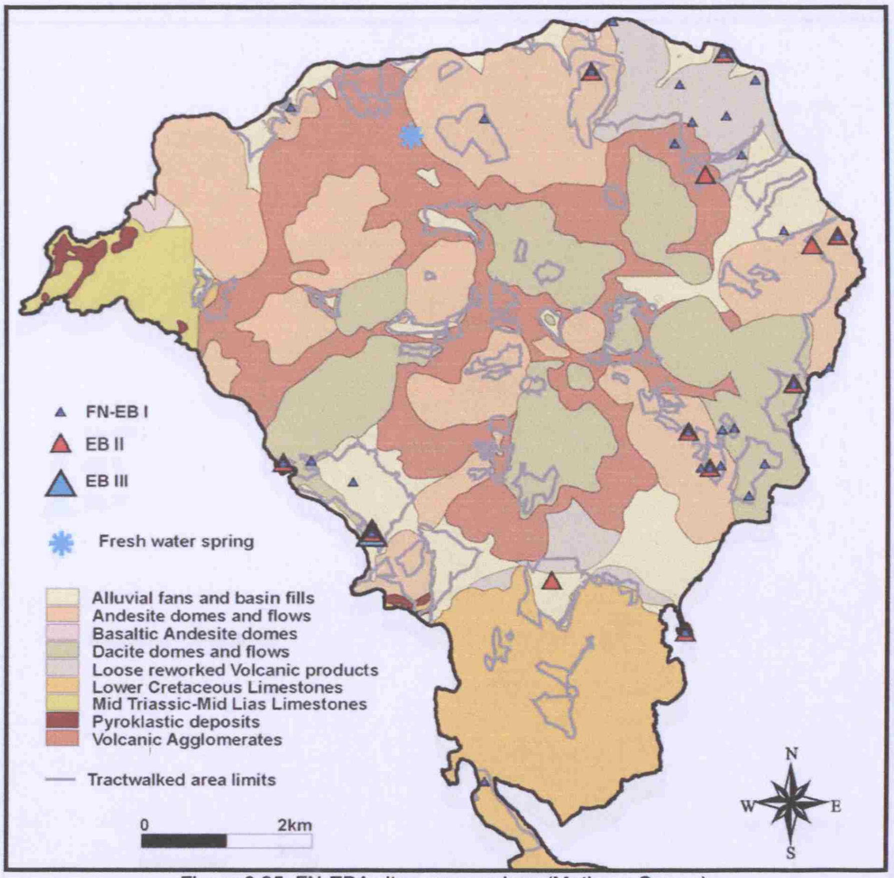


Figure 6.25: FN-EBA sites over geology (Methana Survey)

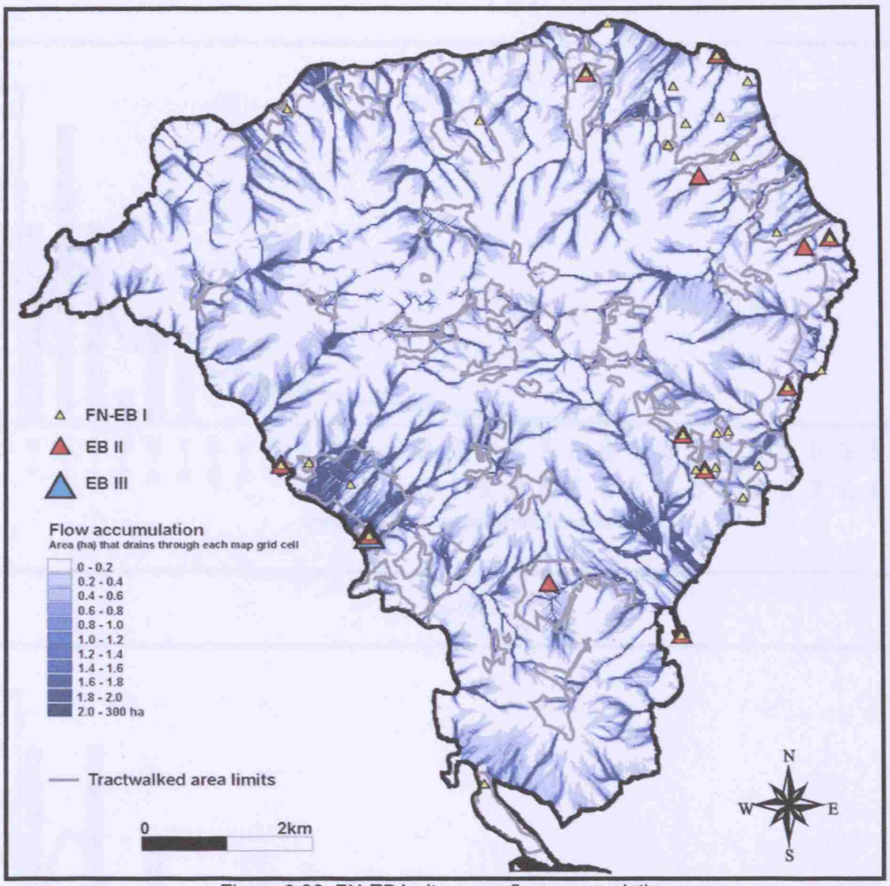


Figure 6.26: FN-EBA sites over flow accumulation

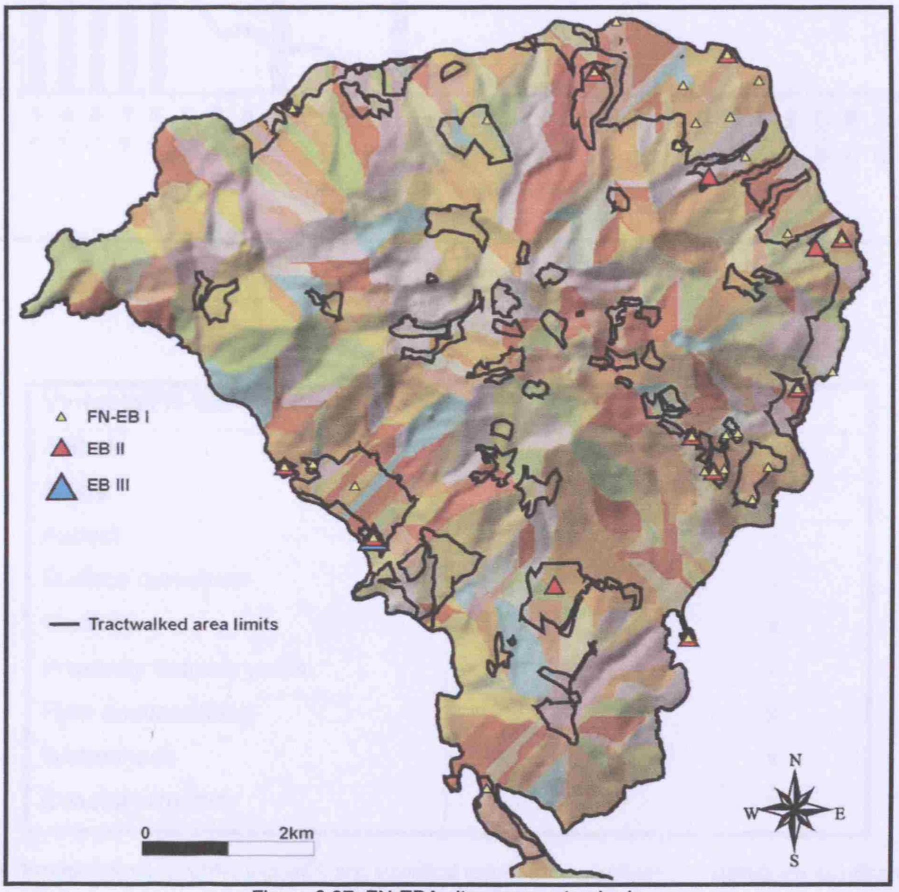
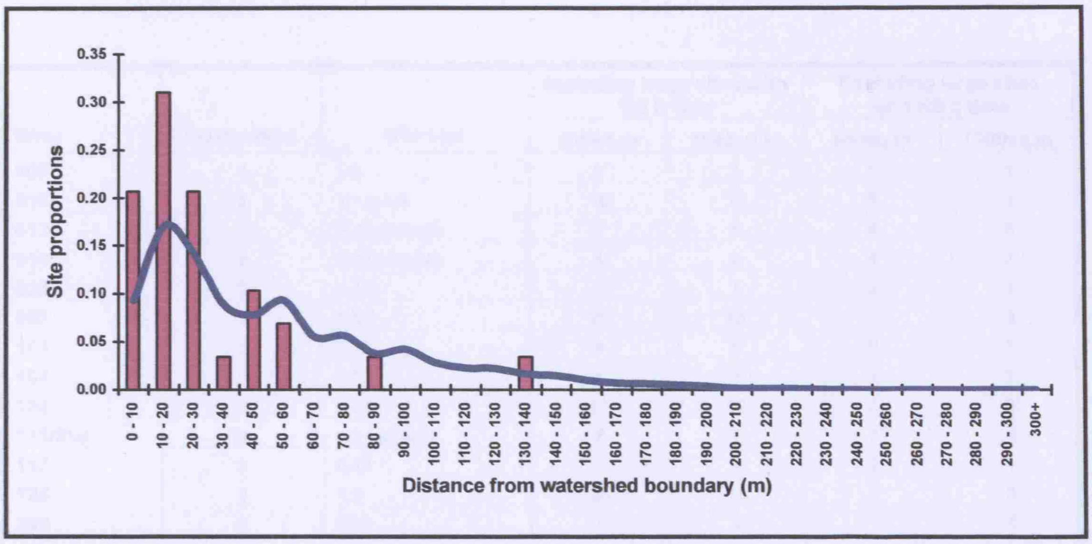
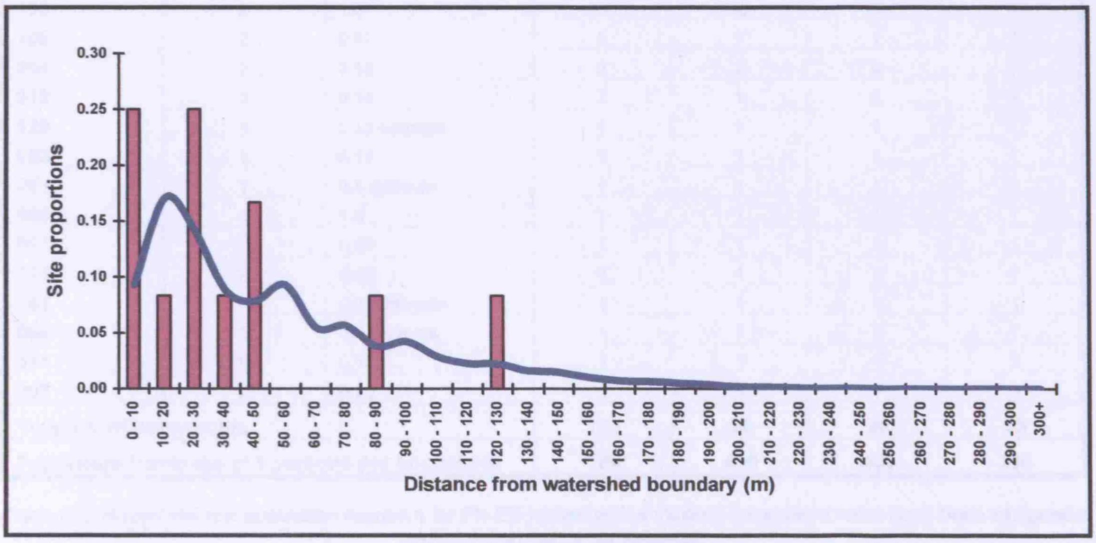


Figure 6.27: FN-EBA sites over watersheds



a) FN-EB I



b) EB II

Figure 6.28: Site distance to watershed boundaries

Variable/FN-EBA phase	FN-EB I	EB II
Altitude	x	x
Slope	✓	x
Aspect	x	x
Surface curvature	✓	x
Geology	✓	x
Proximity to fresh water	-	-
Flow accumulation	✓	x
Watersheds	✓	x
Coastal proximity	x	x

Table 6.4: Environmental variables explored, and statistical results for each phase (✓= statistically significant; x=not statistically significant)

Sites	Component	Site size	Including large sites with EB II date		Excluding large sites with EB II date	
			600sq.m	1000sq.m	600sq.m	1000sq.m
009	3	1.6	1	1	1	1
010	3	1.1 N-LH	18	11	5	3
012	3	0.48 estimate	8	5	8	5
014	3	0.24 estimate	4	2	4	2
028	3	0.14	2	1	2	1
067	3	1.54	26	15	5	3
103	3	0.48	8	5	8	5
107	3	0.03	1	1	1	1
108	3	1.04	17	10	5	3
111/219	3	0.4 estimate	7	4	7	4
112	3	0.13	2	1	2	1
124	3	1.5	25	15	5	3
206	3	0.06	1	1	1	1
026	2	0.13 estimate	2	1	2	1
104	2	0.06	1	1	1	1
105	2	1.01	17	10	17	10
106	2	0.07	1	1	1	1
204	2	0.18	3	2	3	2
213	2	0.14	2	1	2	1
029	1	0.13 estimate	1	1	1	1
053	1	0.11	1	1	1	1
054	1	0.4 estimate	1	1	1	1
060	1	1.8	1	1	1	1
013	1L	0.64	1	1	1	1
015	1L	0.16	1	1	1	1
061	1L	0.29 estimate	1	1	1	1
064	1L	0.3 estimate	1	1	1	1
071	1L	0.11	1	1	1	1
207	1L	0.20	1	1	1	1
Total no. of households			**156**	**98**	**90**	**59**
Population if average of 5 persons per household			**780**	**490**	**450**	**295**

Table 6.5: Household and population numbers for FN-EB I (sites with a minimal component value have been assigned a minimum number of households)

Sites	Component	Site size	Including large sites with FN-EB I date		Excluding large sites with FN-EB I date	
			600sq.m	1000sq.m	600sq.m	1000sq.m
010	3	1.1 N-LH	18	11	5	3
067	3	1.54	26	15	5	3
103	3	0.48	8	5	8	5
124	3	1.5	25	15	5	3
108	2	1.04	17	10	5	3
106	2	0.07	1	1	1	1
111/219	1L	0.4 estimate	1	1	1	1
061	1L	0.29 estimate	1	1	1	1
054	1L	0.4 estimate	1	1	1	1
027	1L	0.03 estimate	1	1	1	1
003	1L	1.29	-	-	-	-
068	1	0.03	1	1	1	1
Total no. of households			**100**	**62**	**34**	**23**
Population if average of 5 persons per household			**500**	**310**	**170**	**115**

Table 6.6: Household and population numbers for EB II (sites with a minimal component value have been assigned a minimum number of households)

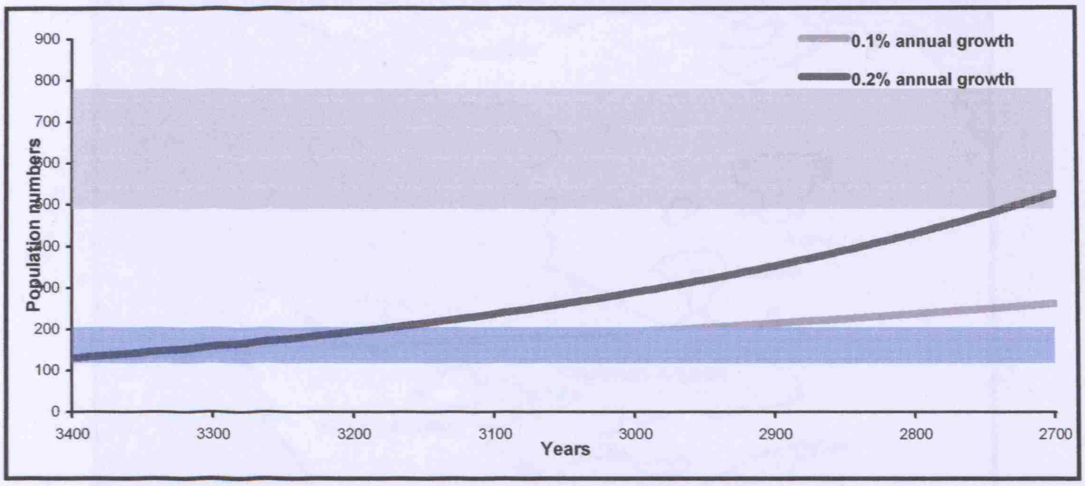


Figure 6.29: Potential population growth for the FN-EB I and EB II at Methana; un-weighted population estimates shaded in grey and weighted estimates in blue.

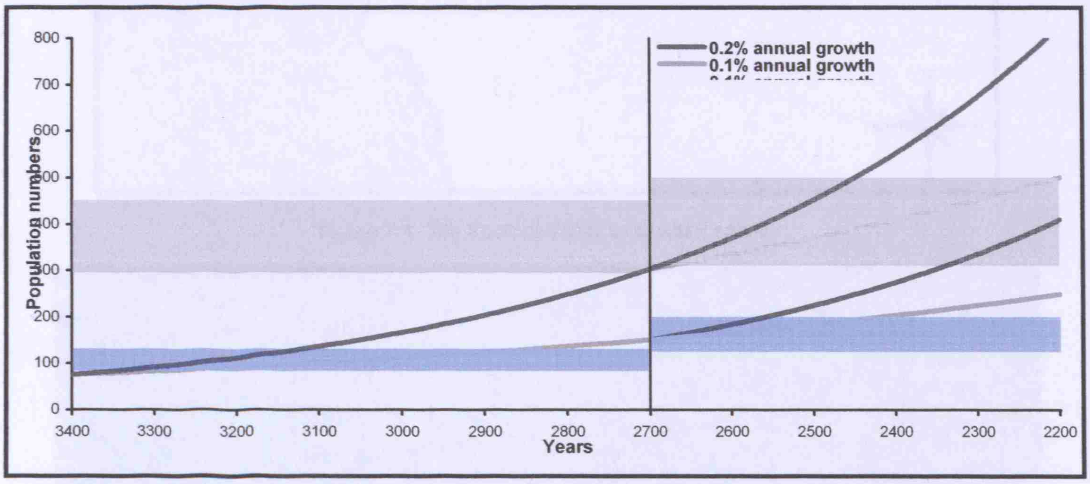


Figure 6.30: Potential population growth for the FN-EB I at Methanai; un-weighted population estimates shaded in grey and weighted estimates in blue.

Chapter 7

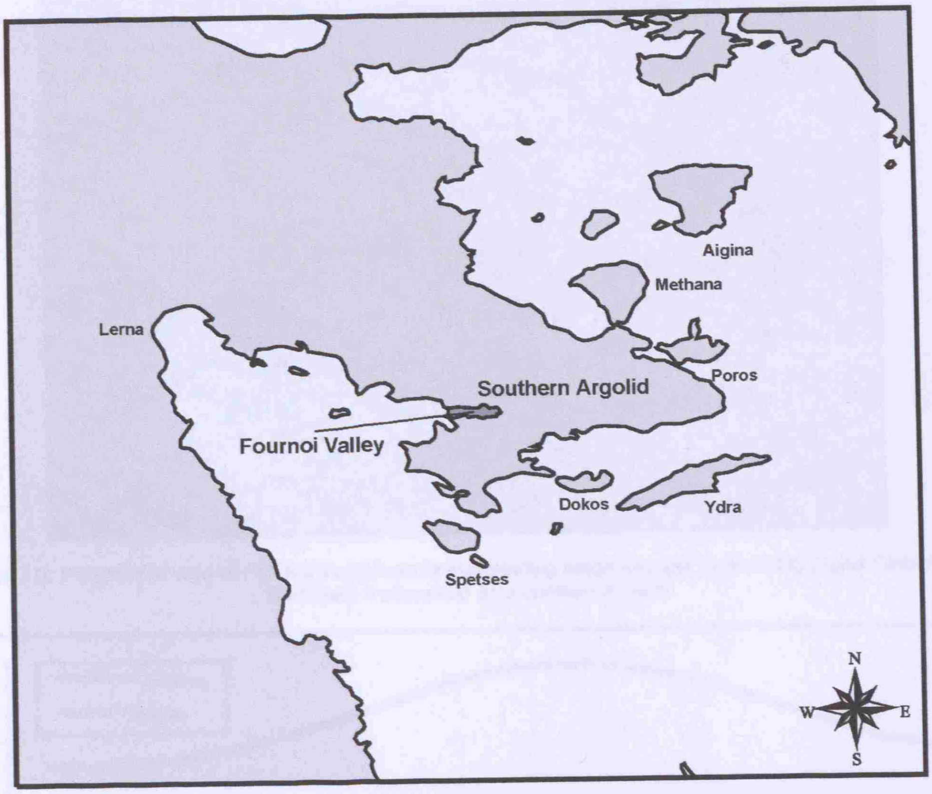


Figure 7.1: The Fournoi Valley in its wider setting

Figure 7.2: Ermionida with the areas discussed in sections 7.1 and 7.2 (Google Earth: 2006 Digital Globe/MDA EarthSat)

Figure 7.3: Perspective view of Fournoi Valley and its surrounding areas (Google Earth: 2006 Digital Globe/MDA EarthSat); tractwalked area outlined in black

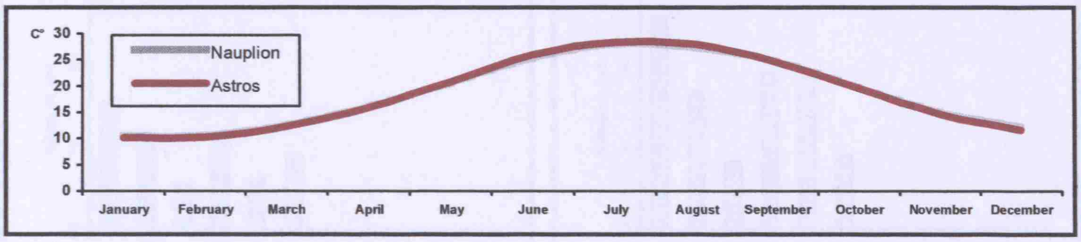


Figure 7.4: Average temperature in the vicinity of Fournoi valley (Hellenic National Meteorological Service)

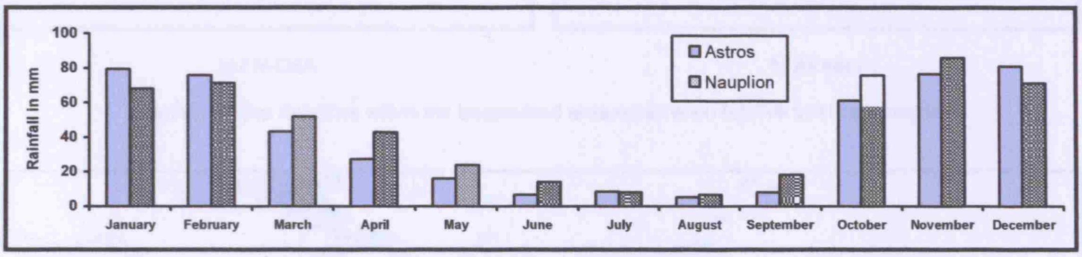


Figure 7.5: Average rainfall in the vicinity of Fournoi valley (Hellenic National Meteorological Service)

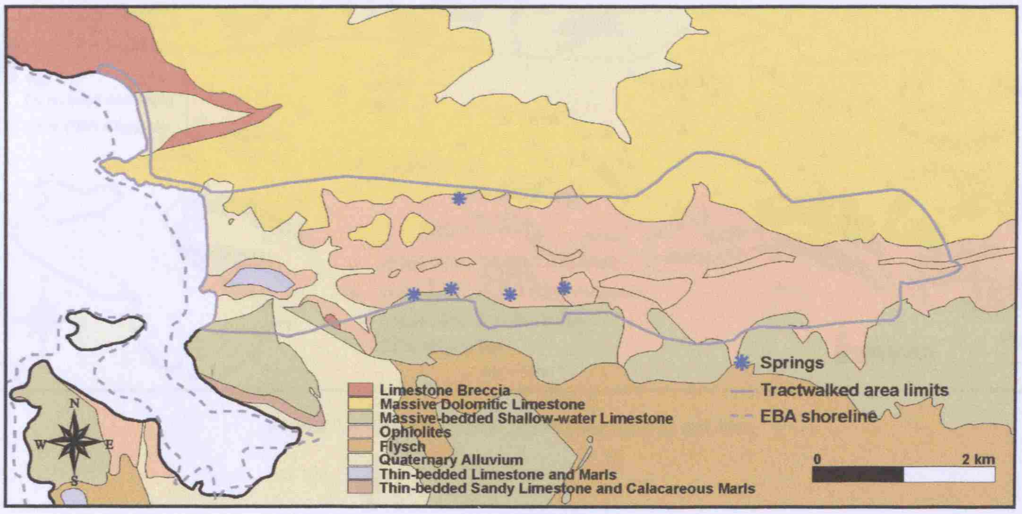


Figure 7.6: Geology and springs

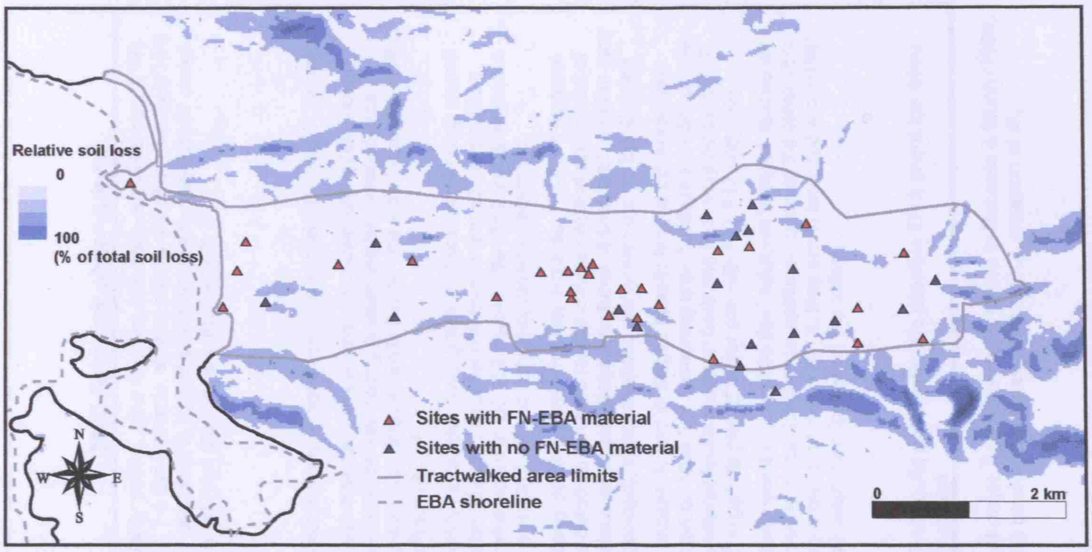
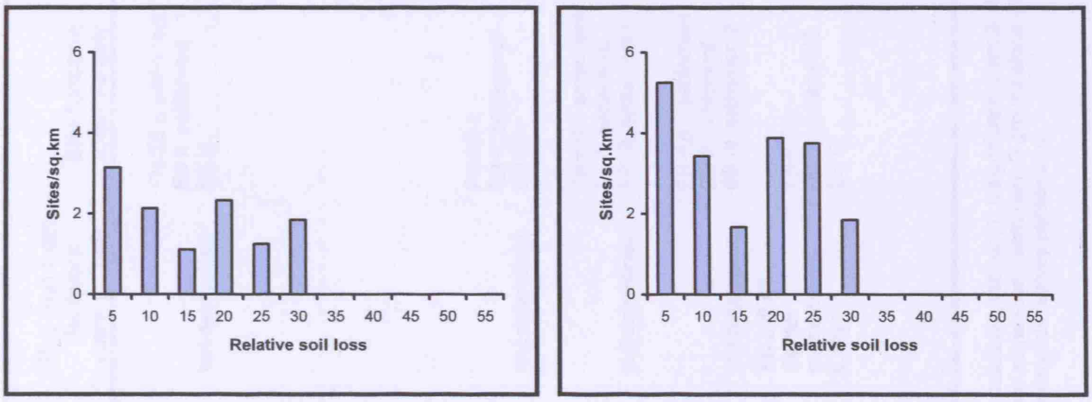


Figure 7.7: Relative soil loss



a) FN-EBA

b) All sites

Figure 7.8: Site densities within the tractwalked area within each relative soil loss category

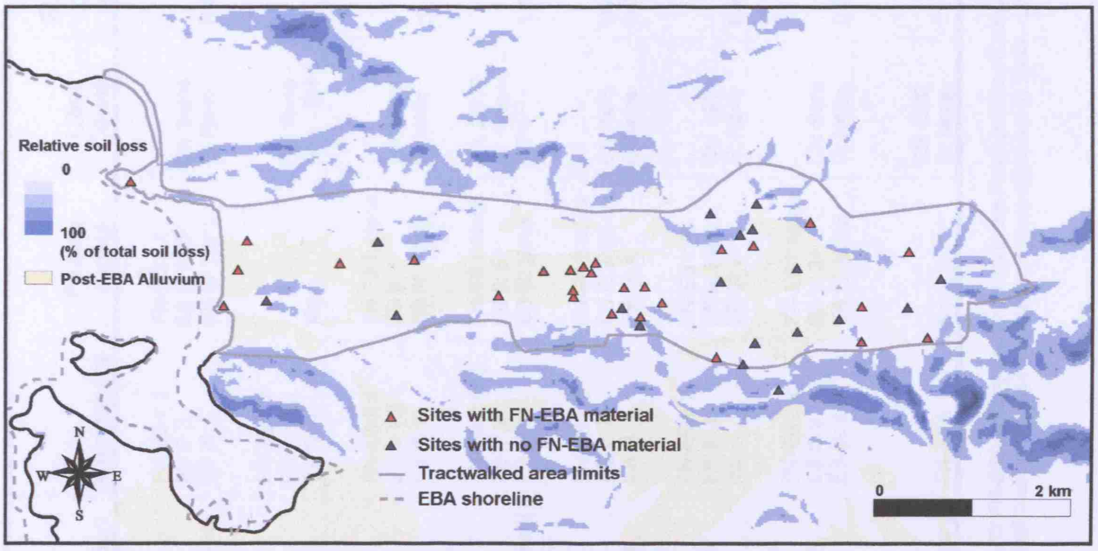


Figure 7.9: Soil deposition areas over relative soil loss

Site	Location	Component	Pottery counts	Lithic Counts	Size (ha) from publication comp 1-3 only	Size (ha) from fieldwork comp 1-3 only	Site function comp 1-3 only	2003 fieldwork observations
F01	Village school yard	FN-EB I: 1 EB II: 3 EB III: x	FN-EB I: 2 EB II: 9(2)+ EB III: None	Ch: None G: None	Not determined	Not determined	FN-EB I: settlement? EB II: settlement EB III: -	Visibility patchy, pine needles, site seriously disturbed; 2 FN-EH I, 7-8 EH II sherds, spilling mostly out of ca. 3m high/35m long section at S limit of school yard; site may extend under adjacent road though no material to its S
F02	Terraces	FN-EB I: x EB II: (1L) EB III: x	None	Ch: None G: 1 - EH II	-	-	-	Off-site material – not visited; no known EB II site in vicinity
F03	Slopes	FN-EB I: x EB II: (1) EB III: x	FN-EB I: None EB II: 1 EB III: None	Ch: None G: None	-	-	-	Off-site material – not visited; no known site uphill, though there could be something outside the tractwalked area boundary less than 400m to the N; less than 300m downhill is site EB II site F7
F04	Promontory	FN-EB I: (1L) EB II: 2 EB III: x	FN-EB I: None EB II: 6+ EB III: None	Ch: 22/10 G: Several - 1 FN	1.4	Not determined	FN-EB I: - EB II: settlement? EB III: -	Visibility quite poor, long grass, surface surrounding church cemented over ; area behind church fenced off; structure remains noted in GC still visible; little EH II visible in places (no obsidian), but no coherent pattern discernible
F05	Village terraces	FN-EB I: 2 EB II: 3 EB III: 1	FN-EB I: 9(3)+ EB II: 33(8)+ EB III: 4	Ch: 14/5 G: None	Not determined but small	Not determined	FN-EB I: settlement EB II: settlement EB III: settlement?	Visibility patchy, better in lower terraces; FN-EH II material was noted on terraces (some collapsing) and spilling out of sections amongst village structures; 4 pieces of obsidian (one arrowhead); concentrations are broken up; no EB III noted
F06	Low rise/ slopes	FN-EB I: 2 EB II: 3 EB III: 1	FN-EB I: 13 EB II: 74(4) EB III: 2	Ch: 45/3 G: None	0.9	Not determined	FN-EB I: settlement EB II: settlement EB III: settlement?	No access: N and W slopes heavily fenced off, house and garden on knoll top, remaining area bulldozed on day of visit; no material found between here and F13; very close to F15 (GC suggests part of larger site with F15,F17 and F32)
F07*	Coastal fields	FN-EB I: x EB II: 2 EB III: x	FN-EB I: None EB II: 3+ EB III: None	Ch: None G: None	0.5	EB II: 0.48 (tighter concentration 0.1ha)	FN-EB I: - EB II: settlement? EB III: -	Visibility good in ploughed field adjacent to coast, fenced off garden to N; ca. 25 sherds, scattered close to the rema 75m in from coast; 11 seem EH II, they are in too good a condition to be wash from further up the valley
F08	Promontory	FN-EBA: ?	None (+)	Ch: (3)/0 G: None	-	-	-	Visibility quite good; only one possible EH II sherd identified near chapel

Table 7.1: Sites with FN-EBA pottery and/or lithics in the Fournoi Valley (Components: ? only possible material; (1) insignificant; 1 small; 2 minor; 3 major; * no other major period in Runnels & Munn (1994) – Artefact counts: () possible material; + more identified in 2003 – Lithics: Ch chipped stone (obsidian/other); G ground stone – L: Dating based on chipped stone – GC: Jameson *et al.*, A Greek Countryside, survey publication)

Site	Location	Component	Pottery counts	Lithic Counts	Size (ha) from publication comp 1-3 only	Size (ha) from fieldwork comp 1-3 only	Site function comp 1-3 only	2003 field work observations and comments
F09*	Slopes	FN-EB I: 3 EB II: (1) EB III: x	FN-EBI:17(4)+ EB II: 1 EB III: None	Ch: 11/44 G: None	0.5	FN-EB I: 0.2	FN-EB I: settlement EB II: - EB III: -	Good visibility, rise mainly ploughed, in areas uncultivated, terraced (soil spilling from collapsed terraces); ca. 10-15 very worn EH I on S slopes, no lithics; site depleted or destroyed by ploughing? GC mentions 59 sherds mostly EH I
F13*	Fields	FN-EB I: x EB II: 3 EB III: x	FN-EB I: None EB II: 3+ EB III: None	Ch: 38/11 G: None	0.44	EB II: 0.45	FN-EB I: - EB II: settlement EB III: -	Visibility varies from poor to excellent between fields, some ploughed with olives others uncultivated. 10+ EH II sherds, and 15 obsidian inc. blades; material stops at rema; no material found between here and F6
F14*	Terraces	FN-EB I: 1 EB II: x EB III: x	FN-EB I: 3(1) EB II: None EB III: None	Ch: 5/162 G: None	Not determined	Not determined	FN-EB I: settlement/ tool production site/ quarry? EB II: - EB III: -	Visibility varied, better in deep ploughed areas; intensively explored terraced slopes of outcrop; only a few worn non-diagnostic sherds at base of SW slope and two pieces of chipped stone half way up S slope
F15*	Sloping fields	FN-EB I: (1) EB II: 3 EB III: x	FN-EB I: 1 EB II: 5+ EB III: None	Ch: 2/2 G: None	1.0	EB II: 0.9	FN-EB I: - EB II: Settlement EB III: -	Fairly good visibility; 20+ EH II sherds, thin scatter, some could be wash from F17; lots of rubble and probable mudbrick; concentration separated from F6 by a narrow road (GC suggests part of larger site with F6,F17 and F32)
F16	Field?	FN-EB I: x EB II: (1) EB III: x	FN-EB I: None EB II: 9 EB III: None	Ch: 8/4 G: None	Not determined	-	FN-EB I: - EB II: settlement? EB III: -	Not visited; not precisely located in GC
F17*	Fields	FN-EB I: 1 EB II: 3 EB III: x	FN-EB I: 3 EB II: 9+ EB III: None	Ch: 4/1 G: None	0.25	Not determined	FN-EB I: settlement? EB II: settlement EB III: -	Visibility good overall; most of the site seems to have been obliterated by modern house and garden landscaping; few EH II sherds S of house, in its garden and also in neighbouring garden further S
F18*	Fields	FN-EB I: (1) EB II: 2 EB III: x	FN-EB I: 1 EB II: 1(2)+ EB III: None	Ch: 0/3 G: None	0.01	EB II: 0.2	FN-EB I: - EB II: settlement EB III: -	Visibility good in two freshly ploughed fields, very poor in third with long dry grass; 50+ sherds, at least 10 EH II (others have mica), despite sparseness of material during survey, ploughing may have brought much more to the surface
F19*	Fields	FN-EB I: (1) EB II: 3 EB III: x	FN-EB I: 1 EB II: 5+ EB III: None	Ch: 95/15 G: None	0.15	Not determined	FN-EB I: - EB II: Settlement? EB III: -	Visibility varied; much of the area was heavily fenced off; thin scatter across two small ploughed fields with 2-3 EH II sherds, but no obsidian; separated from F18 to the S by main Didima-Kranidi road, possibly part of the same site

Table 7.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Size (ha) from publication comp 1-3 only	Size (ha) from fieldwork comp 1-3 only	Site function comp 1-3 only	2003 field work observations and comments
F20*	Hill top/ terraces	FN-EB I: 1 EB II: 3 EB III: x	FN-EB I: 3(1)+ EB II: 109+ EB III: None	Ch: 98/4 G: None	0.28	FN-EB I: 0.06 EB II: 0.25	FN-EB I: settlement? EB II: settlement EB III: -	Visibility excellent in ploughed fields on hill top, patchy on S slopes; 20+ EH II and 3-4 FN-EH I sherds, 3 obsidian (1 flake, 2 blades-one serrated); material on S slope very abraded and spilling from terraces; probably wash, not part of site extent
F21	Fields	FN-EB I: (1) EB II: 2 EB III: x	FN-EB I: 1 EB II: 7+ EB III: None	Ch: 2/0 G: None	0.18	EB II: 0.2	FN-EB I: - EB II: settlement EB III: -	Visibility good in orchard and house garden, poor in grassy field; lots of rubble; abundant later material; 5 EH II sherds and several possible others; no roof-tiles noted (two fragments identified during survey – no date specified)
F22*	Slope/ gorge	FN-EBA: ?L	None	Ch: 31/2 G: None	-	-	Tool production site?	Not visited; concentration of lithics identified in 1979 and mapped, though not the same as concentration identified in 1972 which was never relocated
F23	Terraces	FN-EB I: x EB II: 1 EB III: x	FN-EB I: None EB II: 4 EB III: None	Ch: None G: (2)	1.4	Not determined	FN-EB I: - EB II: Settlement? EB III: -	Good visibility overall; slopes N of road have been bulldozed, flatter area S of road has been greatly modified for the construction of a new warehouse; could not relocate site
F25	Terraces	FN-EB I: ?L EB II: x EB III: x	FN-EB I: None EB II: None EB III: None	Ch: Possible G: None	-	-	Tool production site?	Not visited; lithics concentration including possible FN
F26	Fields?	FN-EB I: x EB II: (1) EB III: x	FN-EB I: None EB II: 3 EB III: None	Ch: None G: None	Not determined	-	FN-EB I: - EB II: ? EB III: -	Not visited; not precisely located in GC
F29	Terraced slopes	FN-EB I: x EB II: 1 EB III: x	FN-EB I: None EB II: 2(2) EB III: None	Ch: None G: None	Not determined	Not determined	FN-EB I: - EB II: Settlement? EB III: -	Visibility generally poor; located Theodorou house on E edge of Fournoi village, but very little material found, none definitively Bronze Age; seems that site has been destroyed by modern building
F30*	Fields?	FN-EBA: ?	None	Ch: 11/6 G: None	-	-	Tool production site?	Not visited; not precisely located in GC

Table 7.1 continued

Site	Location	Component	Pottery counts	Lithic Counts	Size (ha) from publication comp 1-3 only	Size (ha) from fieldwork comp 1-3 only	Site function comp 1-3 only	2003 field work observations and comments
F32	Fields	FN-EB I: 3 EB II: 3 EB III: (1)	FN-EBI:53(2)+ EBII: 650(31)+ EB III: 1	Ch: 2106/28 G: Several -some EH II	2.2	FN-EH I: 0.35 EH II 2 (+F6, F15, F17: 4.5)	FN-EB I: settlement EB II: settlement EB III: -	Very good visibility; hundreds of sherds (ca. 20 FN-EH I and 100+ EH II) and 200+ obsidian (inc. blades, some 30mm long) and other lithics; lots of stones and probable mudbrick; no roof tiles; (GC suggests part of larger site with F6,F17 and F32)
F45*	Terraces	FN-EB I: 3 EB II: x EB III: x	FN-EB I: 13+ EB II: None EB III: None	Ch: 8/8 G: 1 - EH I	Not determined but very small	Not determined	FN-EB I: settlement? EB II: - EB III: -	Visibility varies, pine needles or dry grass; area bulldozed, much soil erosion; visually commanding; 2 EH I sherds and 3 pieces of obsidian; told by locals that site used to have plenty of material but now depleted because people would collect it
F49	Ridge top/ terraces	FN-EB I: 1 EB II: ? EB III: x	FN-EB I: 5 EB II: (1) EB III: None	Ch: None G: None	Not determined but small	Not determined	FN-EB I: storehouse? EB II: - EB III: -	Could not relocate site
F51*	Ridge top	FN-EBA: ?	None	Ch: 30/3 G: None	-	-	Tool production site?	Not visited; lithics concentration, possibly Bronze Age
F54	Terraces	FN-EB I: x EB II: (1) EB III: x	FN-EB I: None EB II: 1 EB III: None	Ch: None G: None	-	-	-	Off-site material – not visited; no known EB II site above it, F23 is ca. 350m W at similar elevation (according to GC)
F58	Fields	FN-EB I: (1) EB II: 2 EB III: x	FN-EB I: 2 EB II: 6+ EB III: None	Ch: None G: 1	0.07	EB II: 0.16	FN-EB I: - EB II: settlement? EB III: -	Good visibility, but soil colour similar to sherd colour; material seems to have been smeared somewhat by ploughing; lots of sherds, 1 FN-EH I, 5 EH II and several other possible, 3 pieces of obsidian

Table 7.1 continued

SITES	FN-EB I	EB II	EB III	FN-EBA	Comments
F01	1 sherds	3 sherds	-	-	
F02	-	(1) lithics	-	-	
F03	-	(1) sherds	-	-	
F04	(1) lithics	2 sherds/obsidian	-	-	
F05	2 sherds/obsidian	3 sherds/obsidian	1 sherds/obsidian	-	
F06	2 sherds/obsidian	3 sherds/obsidian	1 sherds/obsidian	-	Part of F32?
F07	-	2 sherds	-	-	
F08	-	-	-	? obsidian	
F09	3 sherds/obsidian	(1) sherds/obsidian	-	-	
F13	-	3 sherds/obsidian	-	-	
F14	1 sherds/obsidian	-	-	-	
F15	(1) sherds/obsidian	3 sherds/obsidian	-	-	Part of F32?
F16	-	(1) sherds/obsidian	-	-	
F17	1 sherds/obsidian	3 sherds/obsidian	-	-	Part of F32?
F18	(1) sherds/lithics	2 sherds/lithics	-	-	
F19	(1) sherds/obsidian	3 sherds/obsidian	-	-	Part of 18?
F20	1 sherds/obsidian	3 sherds/obsidian	-	-	
F21	(1) sherds/obsidian	2 sherds/obsidian	-	-	
F22	-	-	-	? obsidian	
F23	-	1 sherds/lithics	-	-	
F25	? lithics	-	-	-	
F26	-	(1) sherds	-	-	
F29	-	1 sherds	-	-	
F30	-	-	-	? obsidian	
F32	3 sherds/obsidian	3 sherds/obsidian	(1) sherds/obsidian	-	
F45	3 sherds/obsidian	-	-	-	
F49	1 sherds	? sherds	-	-	
F51	-	-	-	? obsidian	
F54	-	(1) sherds	-	-	
F58	(1) sherds/lithics	2 sherds/lithics	-	-	

Table 7.2: Sites with FN-EBA pottery and/or lithics in the Fournoi valley (Components: ? only possible material; (1) insignificant; 1 small; 2 minor; 3 major)

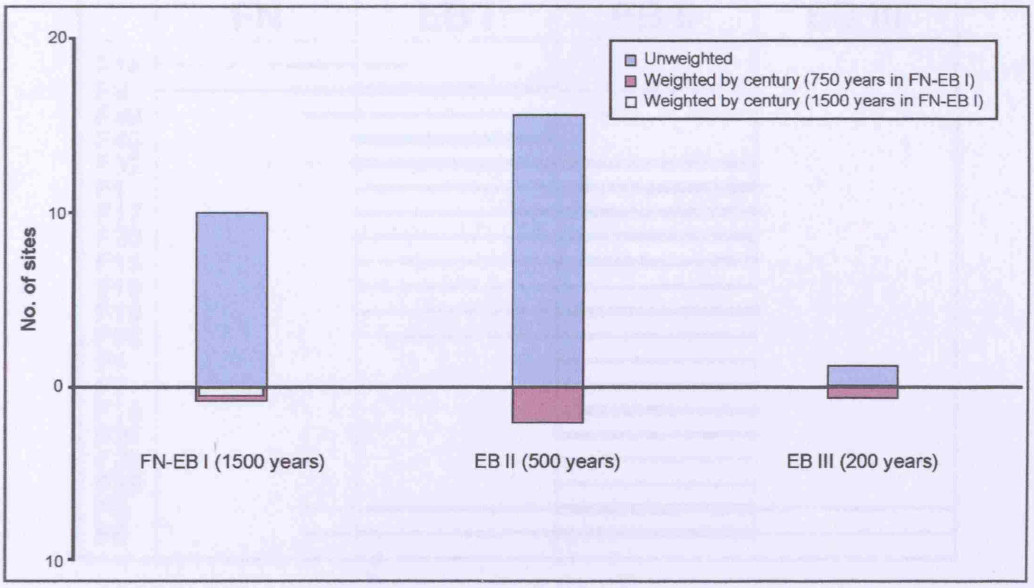


Figure 7.10: Number of sites within each FN-EBA phase (components 1-3)

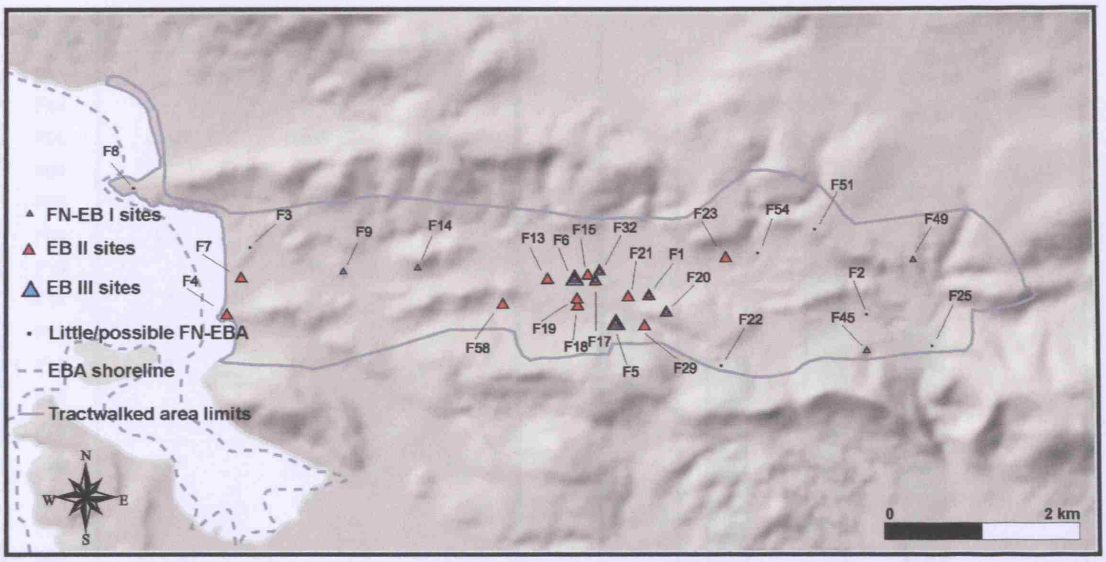


Figure 7.11: FN-EBA sites in the Fournoi Valley

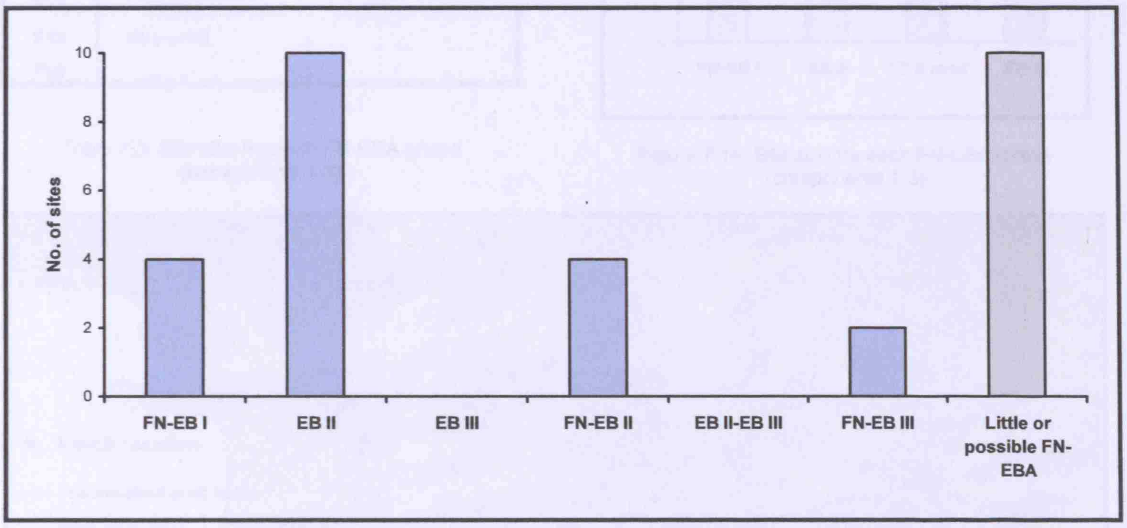


Figure 7.12: Sites in the Fournoi Valley grouped according to the number of FN-EBA phases they cover

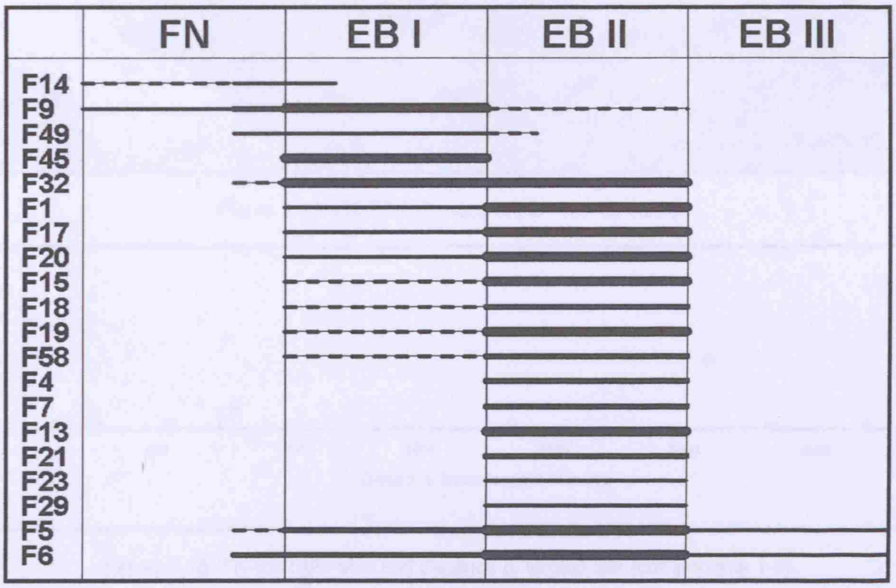


Figure 7.13: Sites in the Fournoi Valley in each phase (components 1-3 – line thickness indicates component; dashed line indicates insignificant material)

SITES	FN-EB I	EB II	EB III
F01	?	?	-
F04	-	?	-
F05	Small	Small	Small
F06	?	0.9	?
F07	-	0.48	-
F09	0.2	-	-
F13	-	0.45	-
F14	?	-	-
F15	-	0.9	-
F17	?	0.25	-
F18	-	0.2	-
F19	-	0.15	-
F20	0.06	0.25	-
F21	-	0.2	-
F23	-	?	-
F29	-	?	-
F32	0.35	2	-
F45	Small	-	-
F49	Very small	-	-
F58	-	0.16	-

Table 7.3: Site size for each FN-EBA phase (components 1-3)

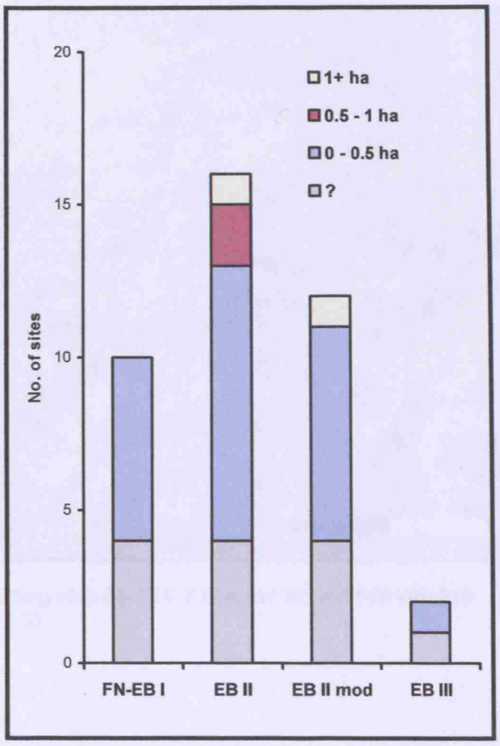


Figure 7.14: Site size for each FN-EBA phase (components 1-3)

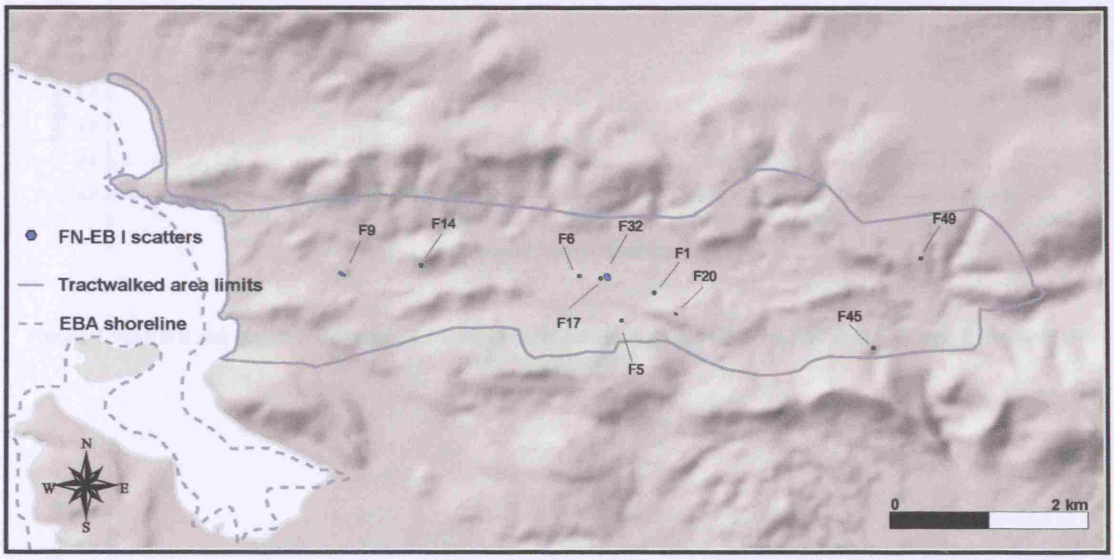


Figure 7.15: FN-EB I site size in the Fournoi Valley

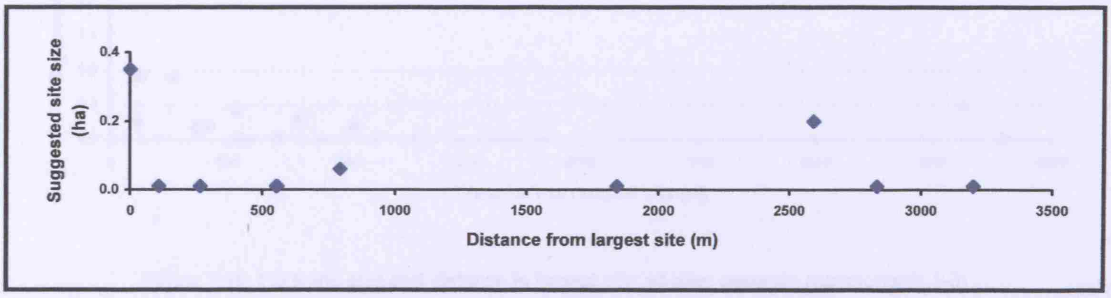


Figure 7.16: FN-EB I site size and distance to largest site (components 1-3)

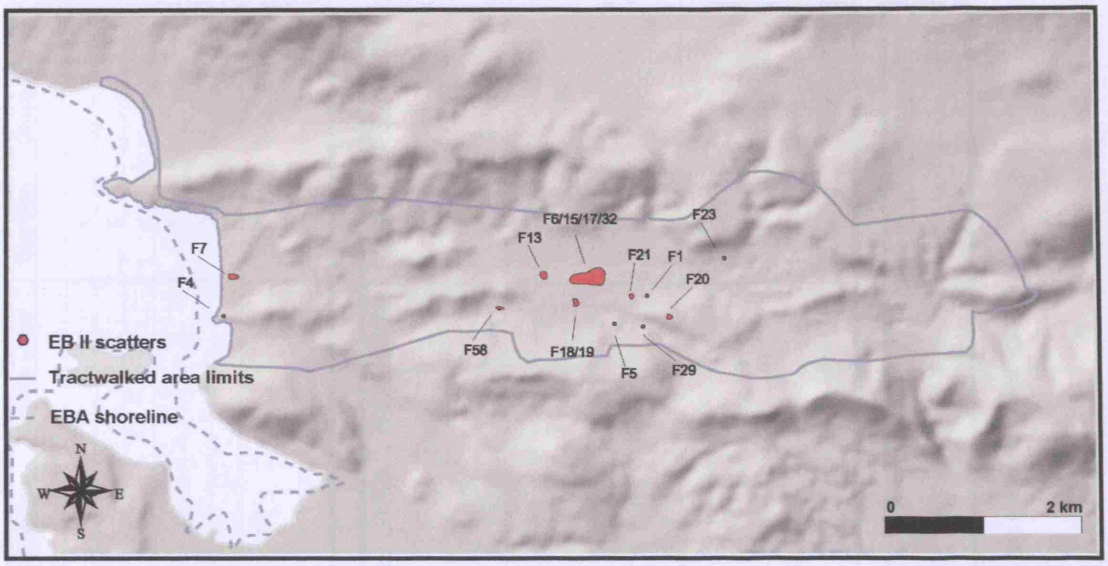


Figure 7.17: The size of EB II sites in the Fournoi Valley combining sites F6, F15, F17 with F32, and F18 with F19 (components 1-3)

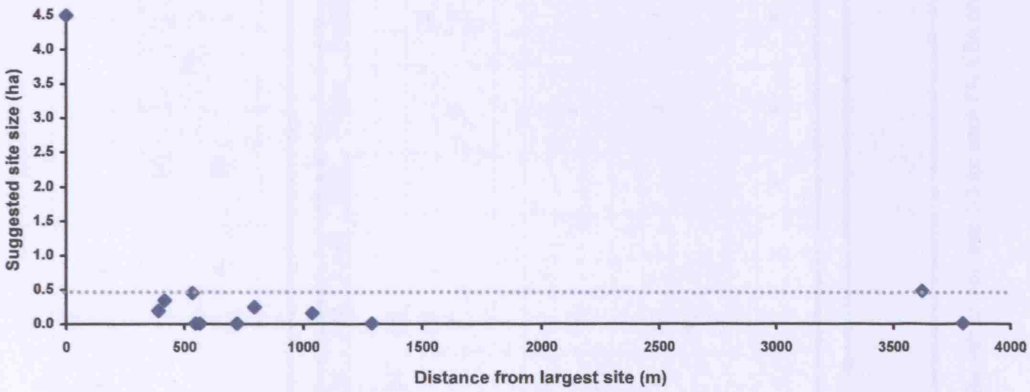


Figure 7.18: EB II site size and distance to Fournoi Focus combining sites F6, F15, F17 with F32, and F18 with F19 (components 1-3)

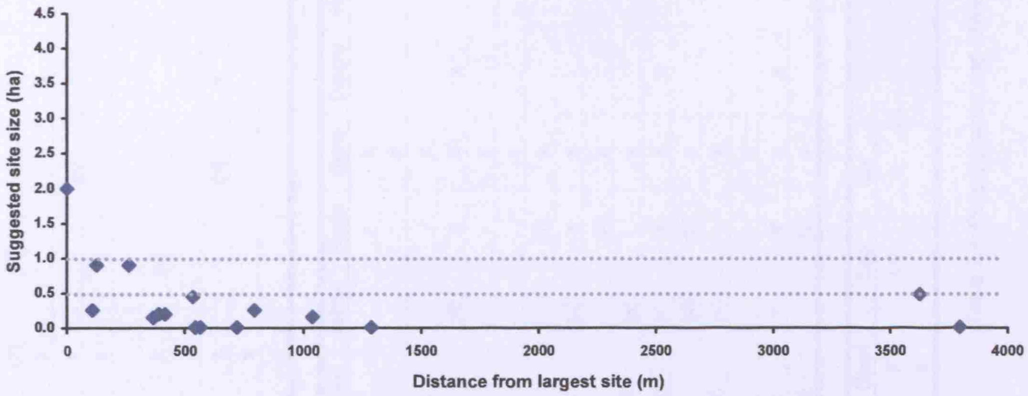


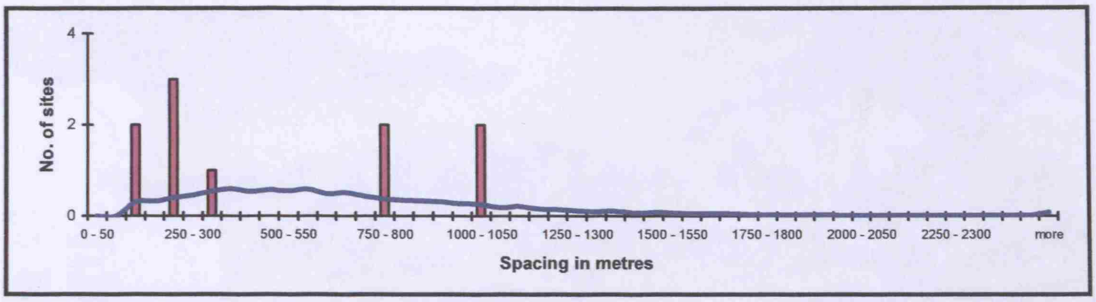
Figure 7.19: EB II site size and distance to largest site; all sites separate (components 1-3)

FN-EB I	Open	Closed	Askos	Basin	Bowl	Fruitstand	Frying pan	Jar	Jug	Pithos	Pyxis	Saucer	Spindle whorl	Obsidian	Groundstone
F01		(x)			x										
F05	x	x			x									x	
F06	x	x		(x)	x									x	
F09	x	x					x	x					x	x	
F14	x													x	
F17		x	(x)						(x)		(x)			x	
F20	x				x					(x)				x	
F32	x	x		(x)	x	x		x	(x)			(x)		x	x
F45	x	x												x	x
F49		x													

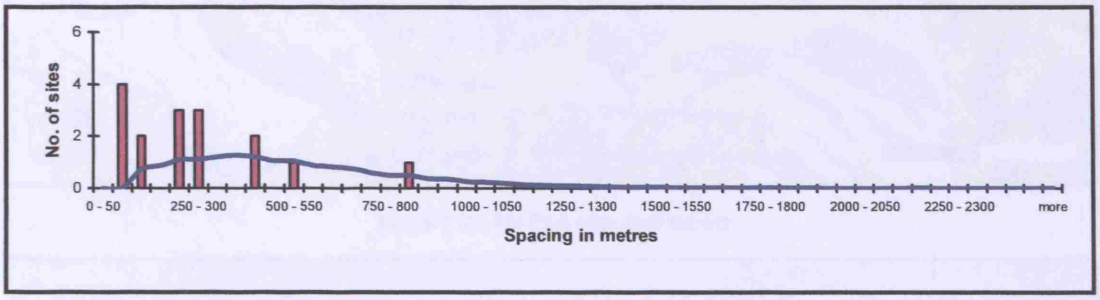
EB II	Open	Closed	Askos	Basin	Bowl	Dipper	Hearth	Hydria	Jar	Jug	Ladle	Pan	Pithos	Rooftile	Sauceboat	Saucer	Scoop	Stand	Obsidian	Groundstone
F01				x	x				(x)						x					
F04					x				(x)	(x)									x	x
F05	x	x			x		x	x	x	(x)				x	x	(x)			x	
F06	x	x	(x)	x	x	x			x	x			x	x	x	(x)		x	x	
F07					x										(x)					
F13					x										(x)	(x)			x	
F15				(x)	x				x				x		(x)	(x)			x	
F17		x	(x)	x	x				x	(x)			x		(x)	(x)			x	
F18	(x)			(x)	x				(x)							(x)				
F19		(x)	(x)		x														x	
F20		x	(x)	x	x	x	x	(x)	x	(x)			x	x	x	(x)			x	
F21			(x)	(x)	x					(x)					(x)				x	
F23	x	(x)	(x)		x					(x)										(x)
F29	(x)				x										(x)					
F32	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
F58		(x)		(x)	x										(x)					x

EB III	Open	Bowl	Cup	Jar		Obsidian	Groundstone
F05	x	x	(x)	x		x	
F06		x				x	

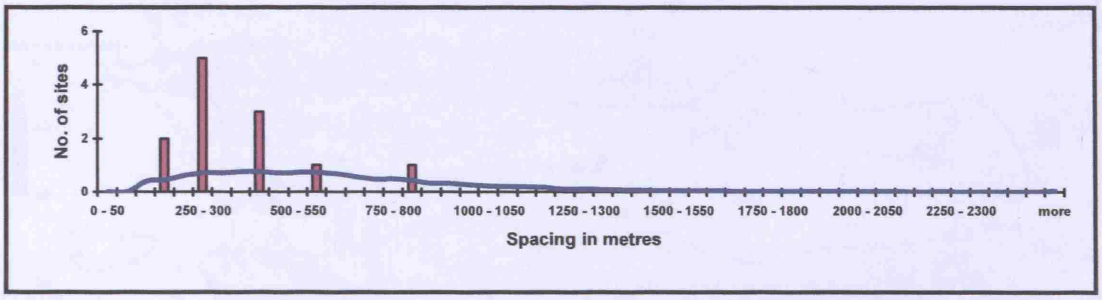
Table 7.4: Pottery shapes and lithics present at each site with component 1-3 for each FN-EBA phase (blue indicates shapes identified in 2003)



a) FN-EB I



b) EB II



c) EB II modified

Figure 7.20: Spacing of sites within the survey area

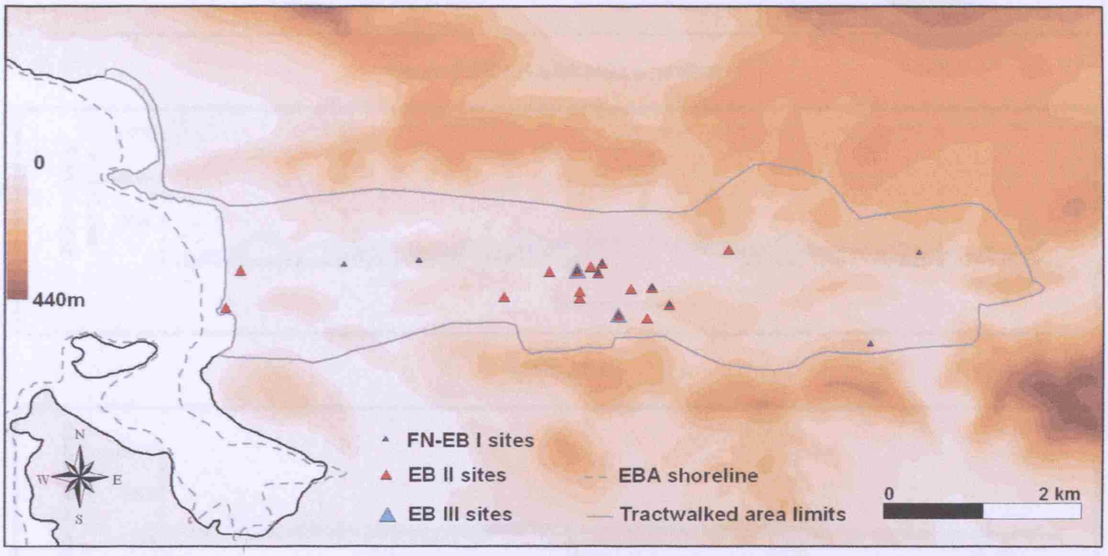


Figure 7.21: FN-EBA sites over altitude

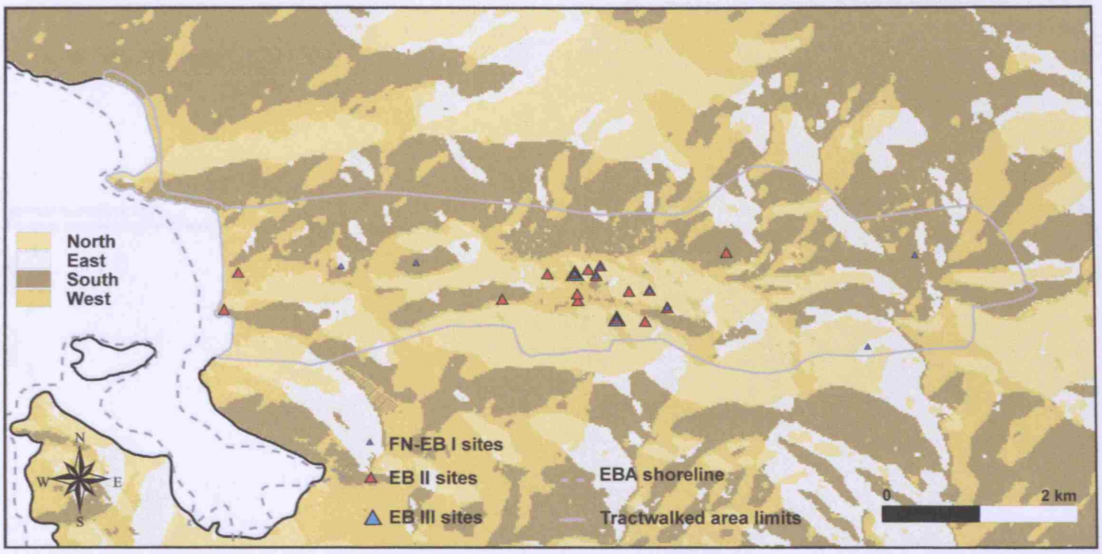


Figure 7.22: FN-EBA sites over aspect

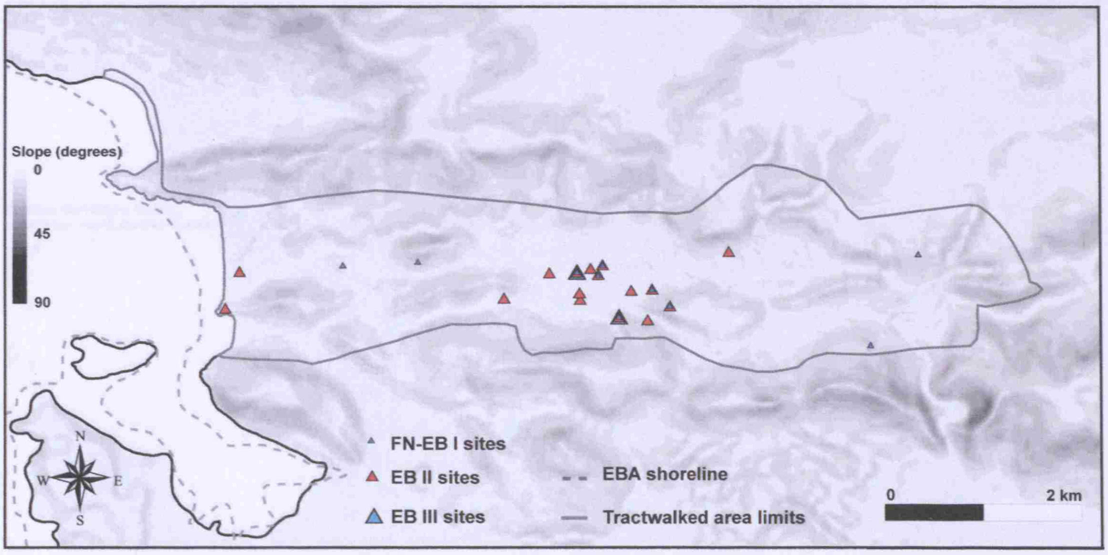
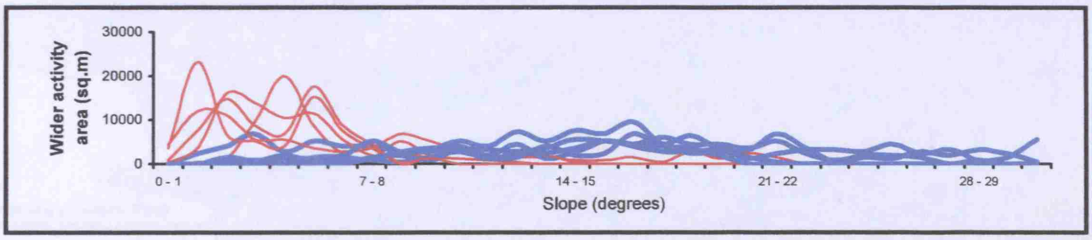
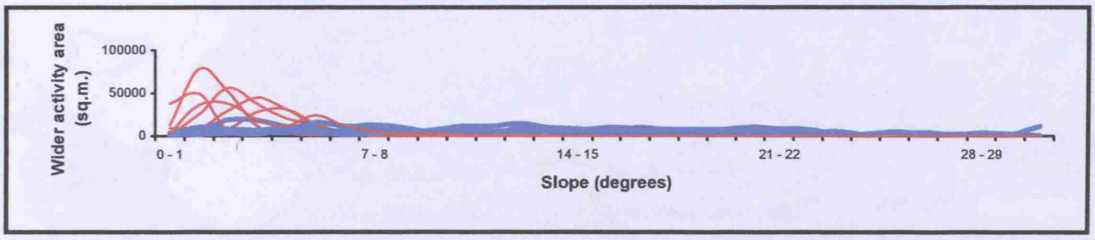


Figure 7.23: FN-EBA sites over slope

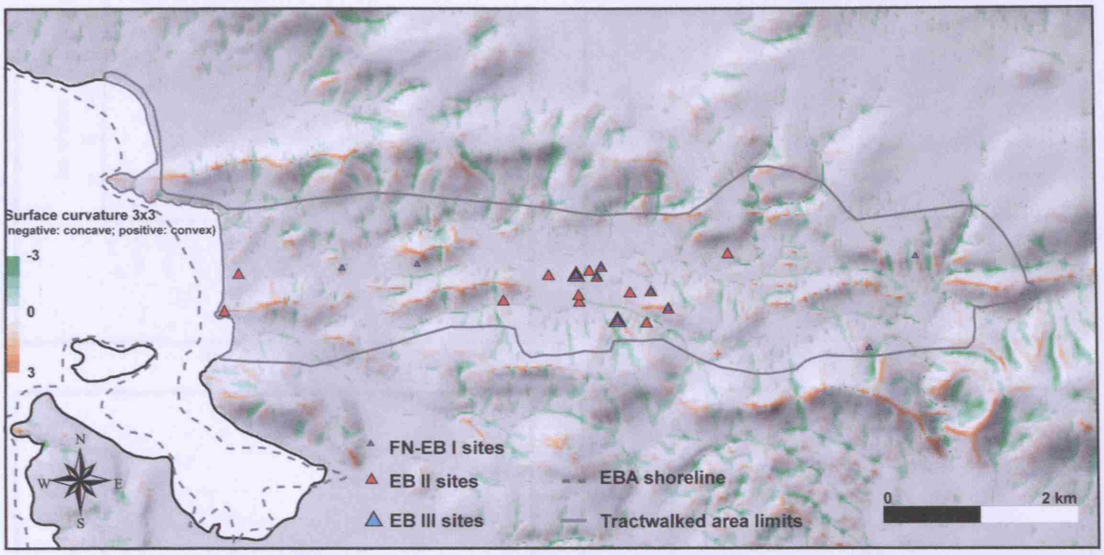


a) FN-EB I

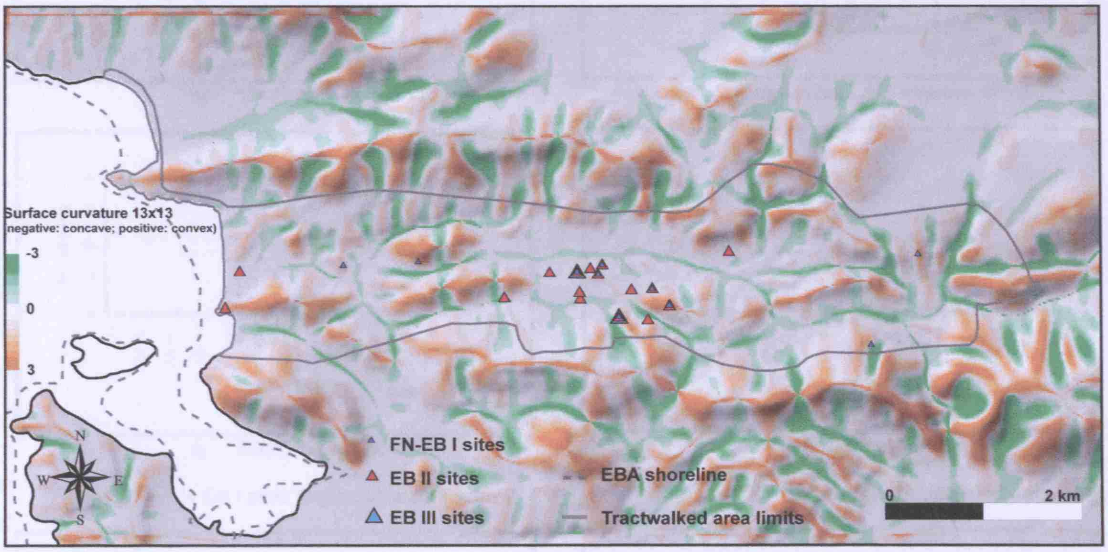


b) EB II modified

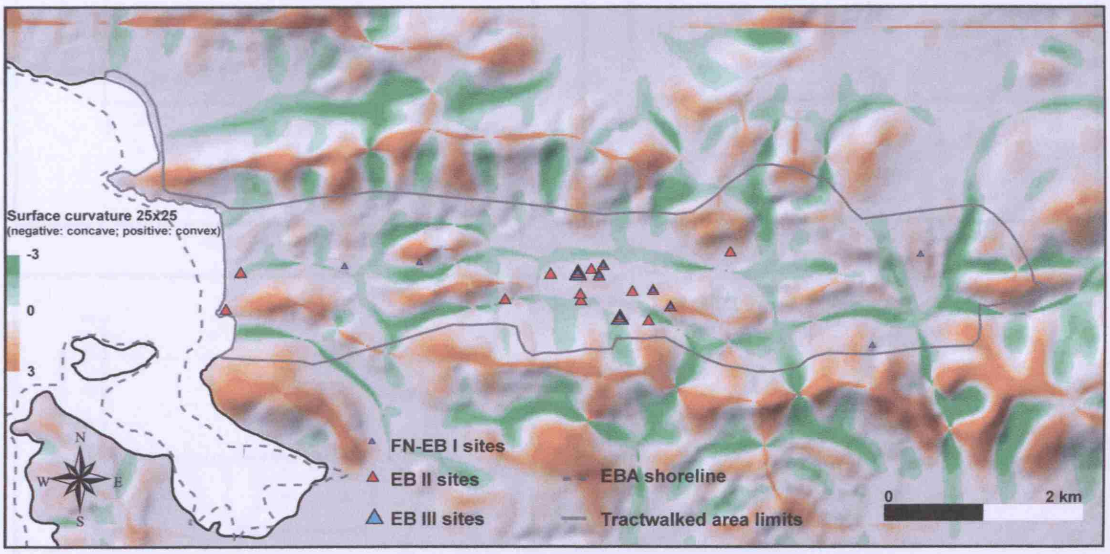
Figure 7.24: Slope within wider activity area of each site (sites predominantly on steep slope in blue)



a) 3x3 cell neighbourhood

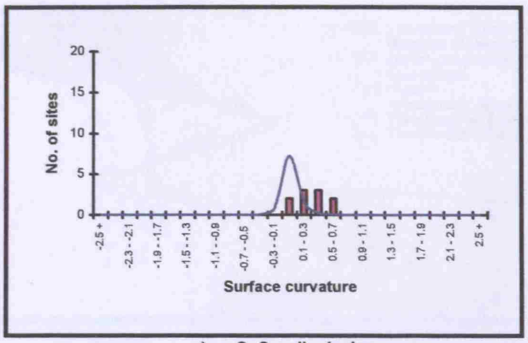


b) 13x13 cell neighbourhood

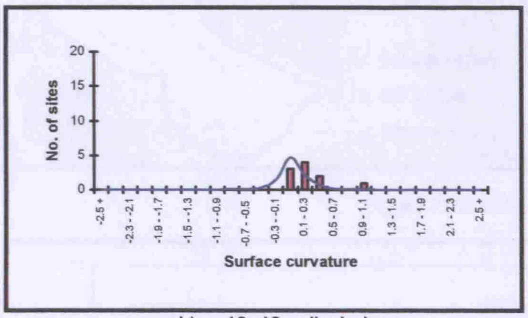


c) 25x25 cell neighbourhood

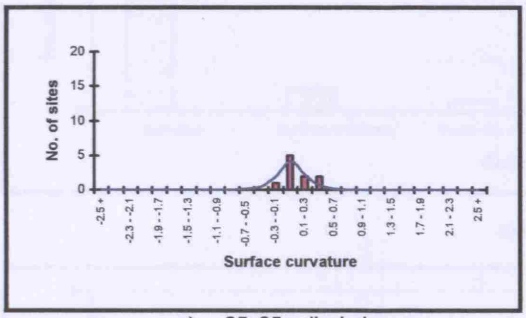
Figure 7.25: FN-EBA sites over surface curvature



a) 3x3 cell window

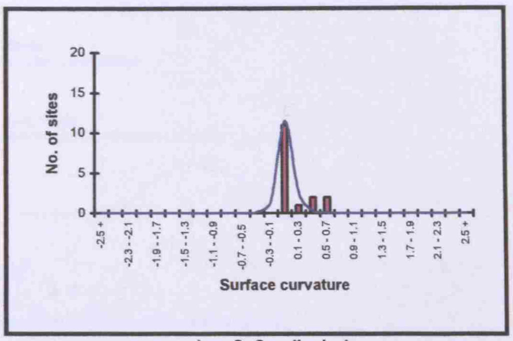


b) 13x13 cell window

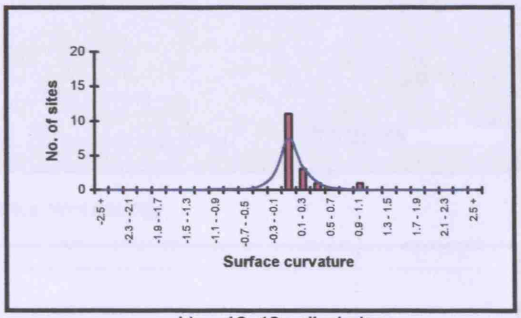


c) 25x25 cell window

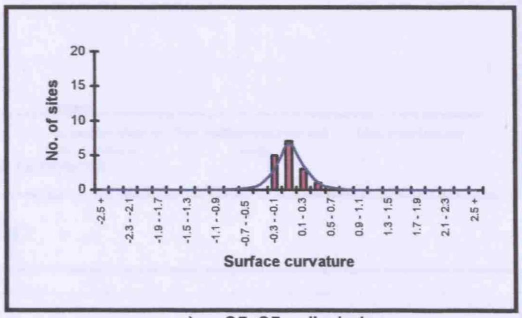
Figure 7.26: FN-EB I sites and surface curvature



a) 3x3 cell window

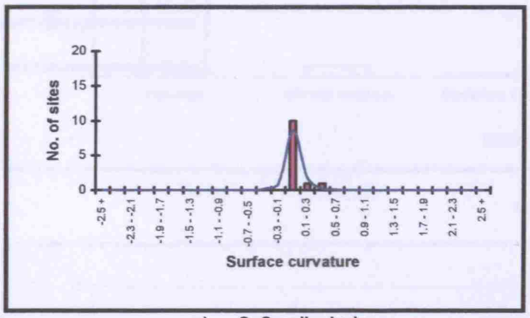


b) 13x13 cell window

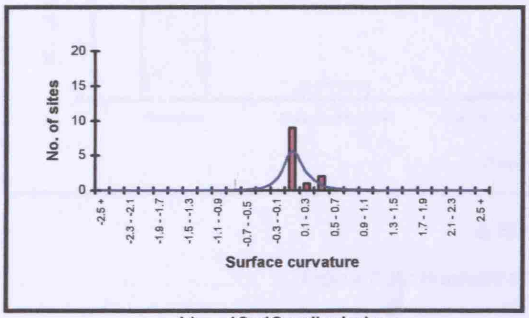


c) 25x25 cell window

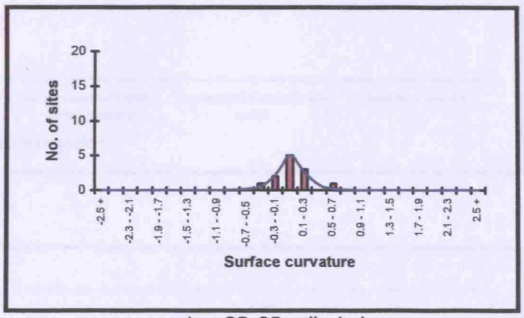
Figure 7.27: EB II sites and surface curvature



a) 3x3 cell window



b) 13x13 cell window



c) 25x25 cell window

Figure 7.28: EB II (modified) sites and surface curvature

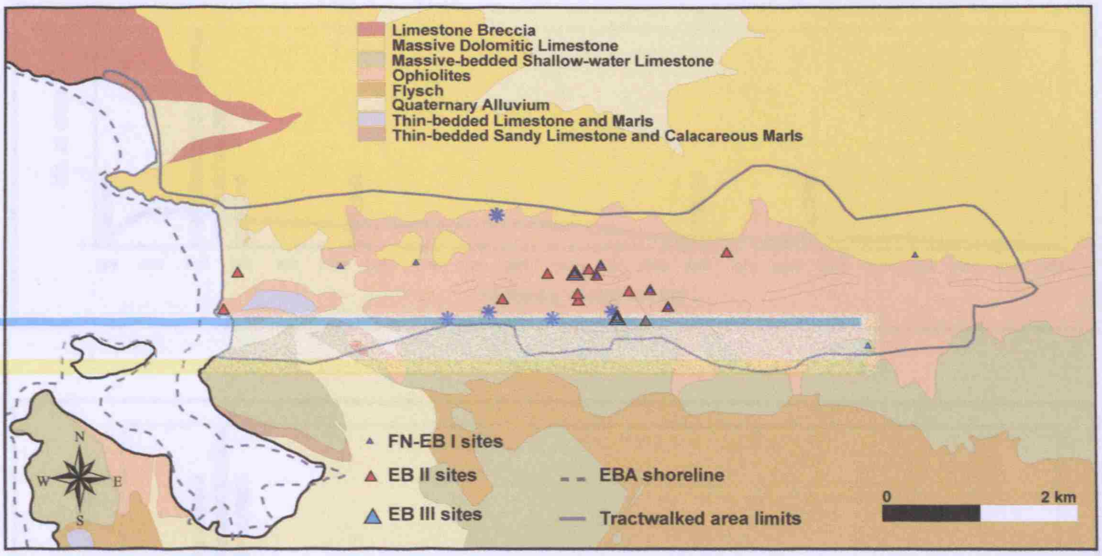


Figure 7.29: FN-EBA sites over geology

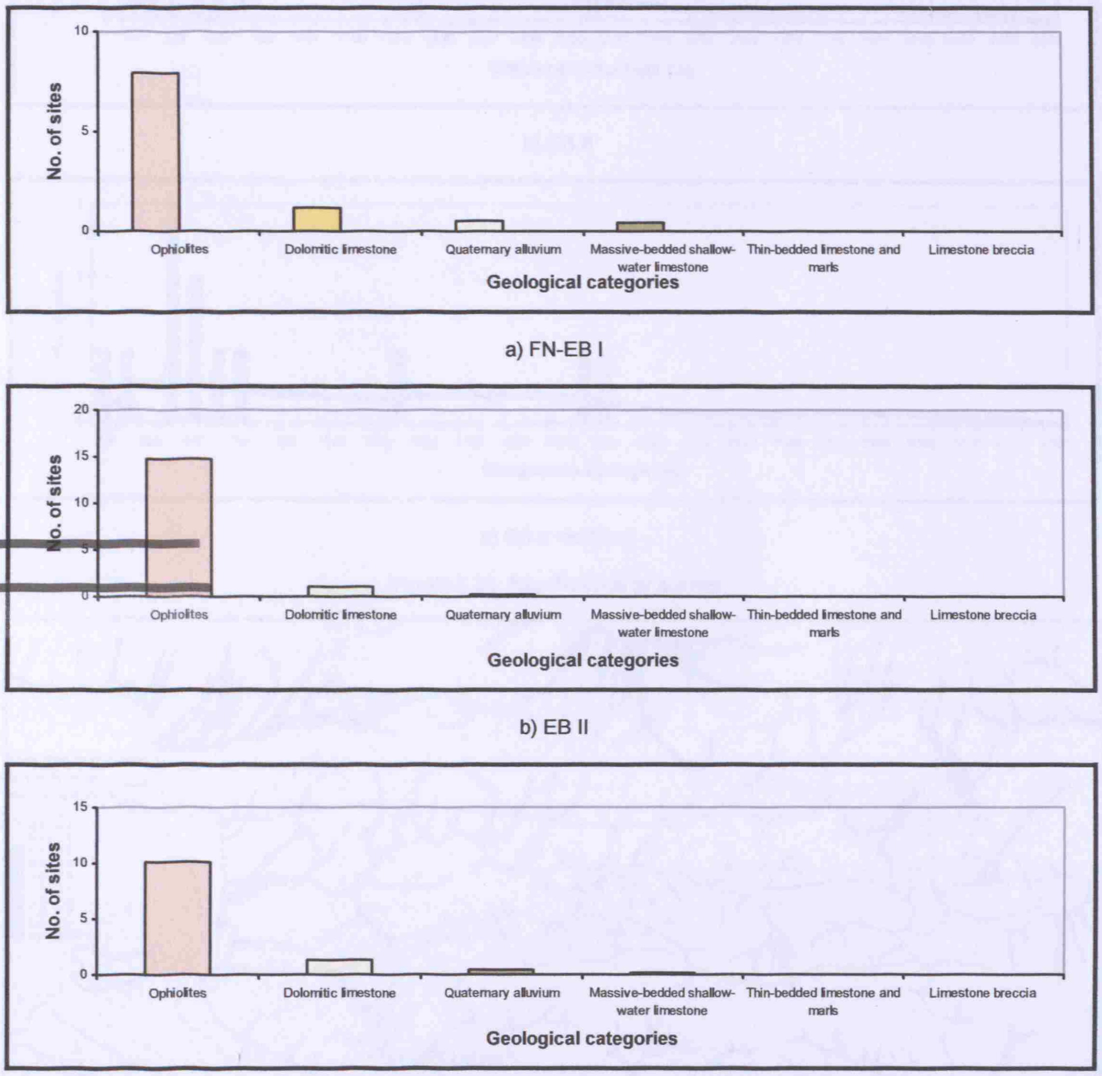
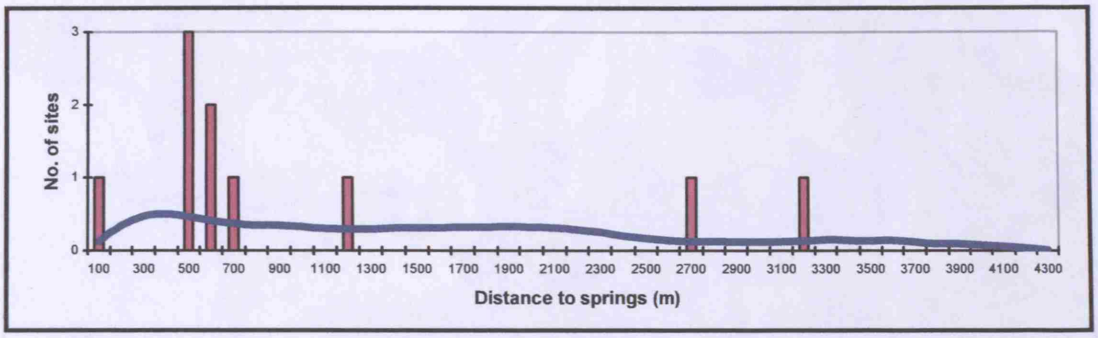
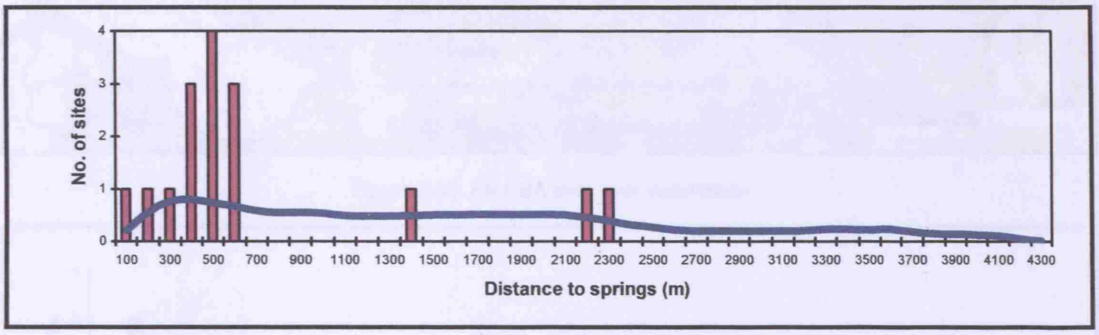


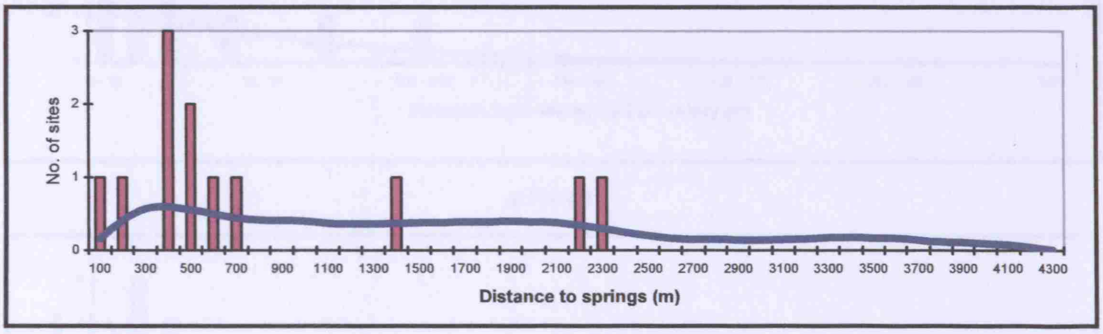
Figure 7.30: Numbers of sites per geological category



a) FN-EB I



b) EB II



c) EB II modified

Figure 7.31: Site distance to springs

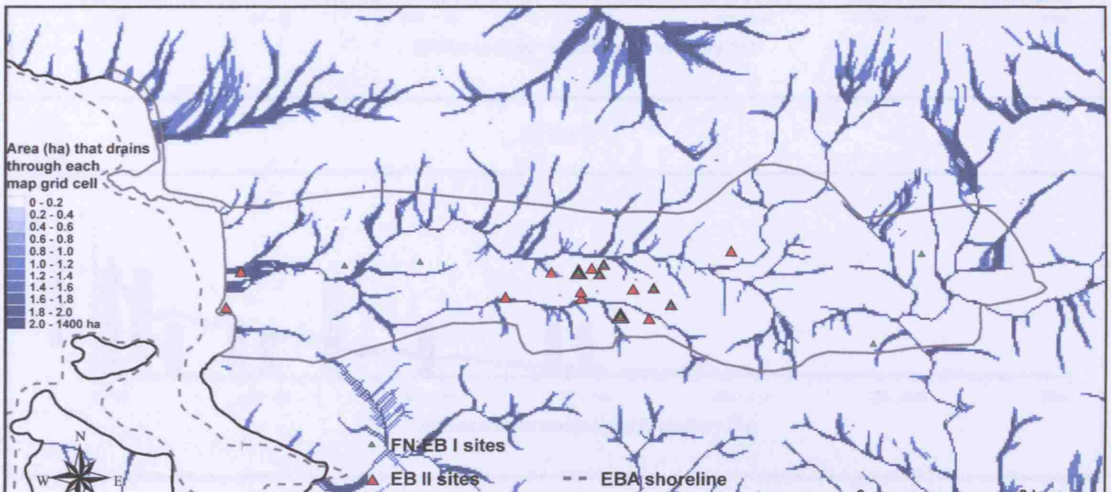


Figure 7.32: FN-EBA sites over water runnoff

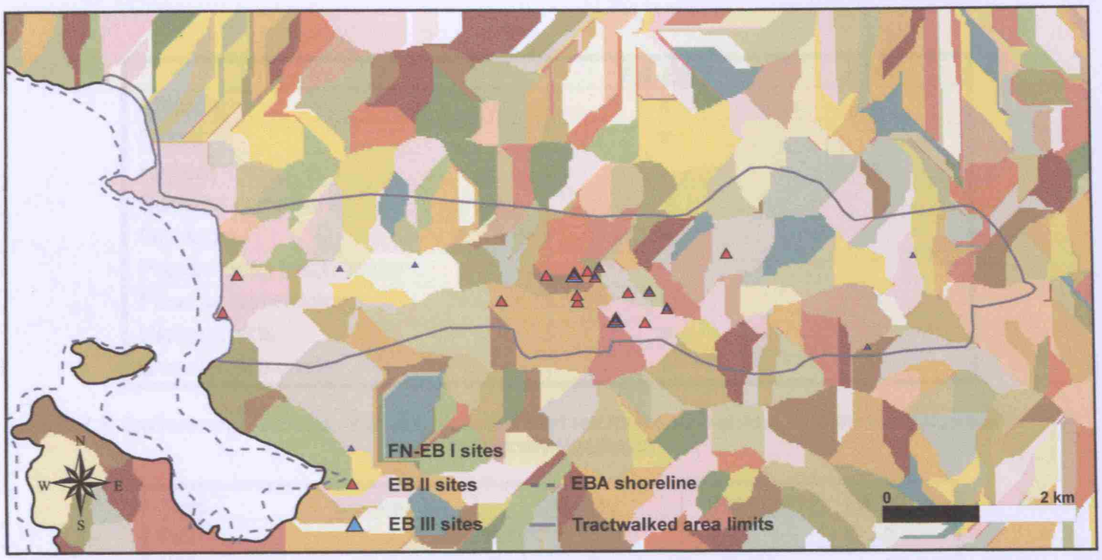
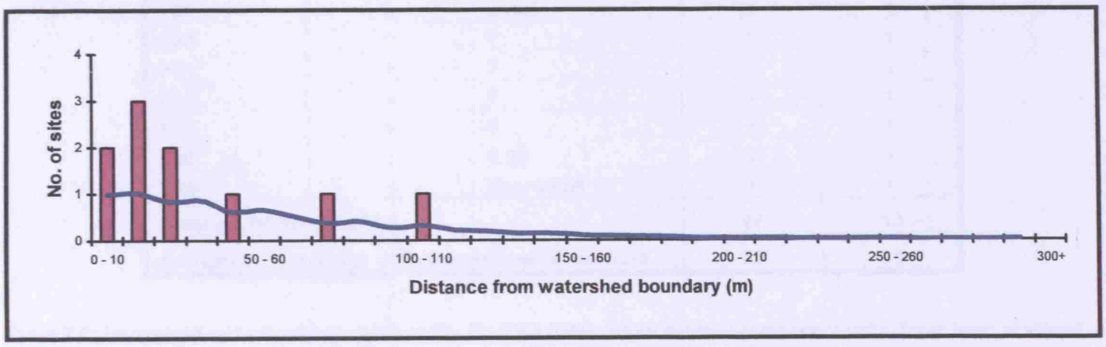
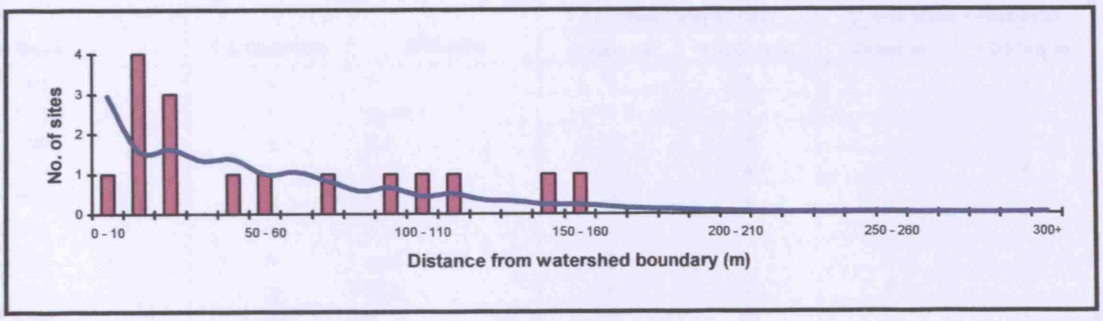


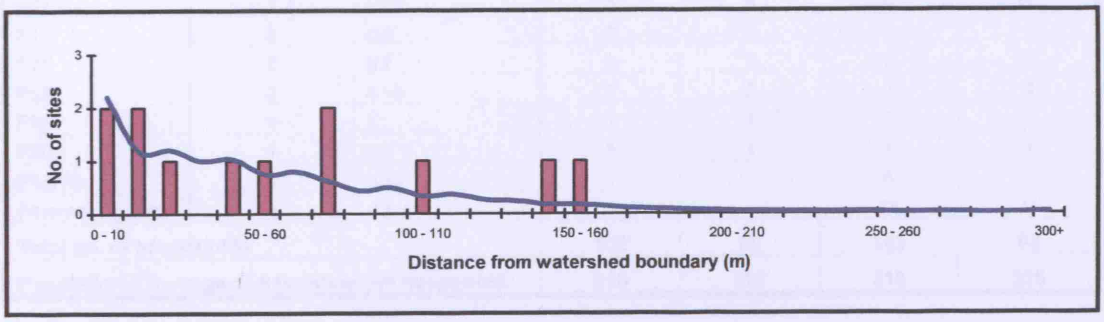
Figure 7.33: FN-EBA sites over watersheds



a) FN-EB I



b) EB II



c) EB II modified

Figure 7.34: Site distance to watershed boundaries

	FN-EB I	EB II
Altitude	x	x
Slope	x	x
Aspect	x	x
Surface curvature	✓	x
Geology	x	✓
Proximity to fresh water	✓	✓
Flow accumulation	x	x
Watersheds	x	x
Coastal proximity	x	✓

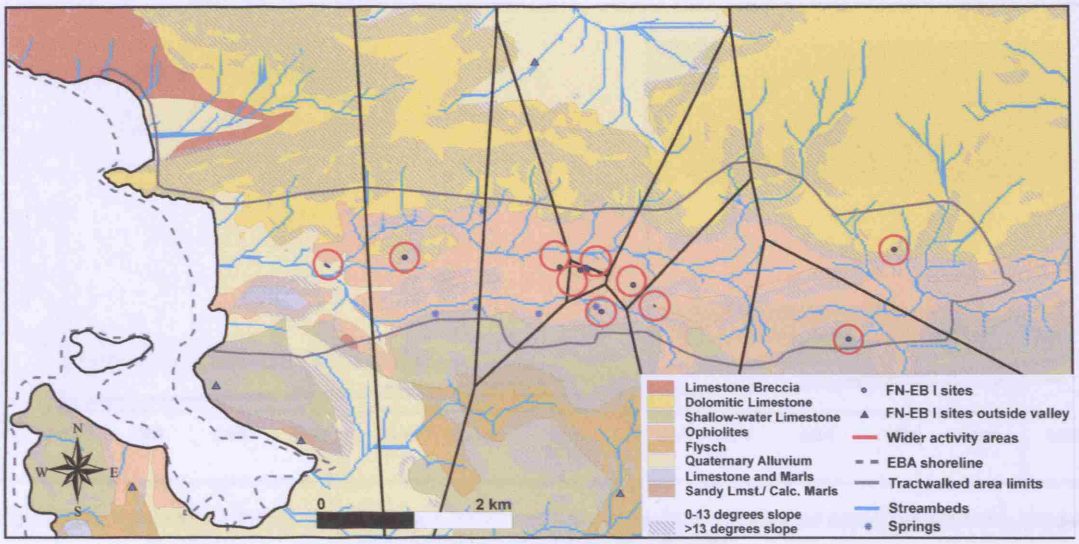
Table 7.5: Environmental variables explored, and statistical results for each phase (□= statistically significant; x=not statistically significant)

Sites	Component	Site size	600sq.m	1000sq.m
F09	3	0.2	3	2
F32	3	0.35	6	3
F45	3	Small	1	1
F05	2	Small	1	1
F06	2	?	1	1
F01	1	?	1	1
F14	1	?	1	1
F17	1	?	1	1
F20	1	0.06	1	1
F49	1	Very small	1	1
Total no. of households			**17**	**13**
Population if average of 5 persons per household			**85**	**65**

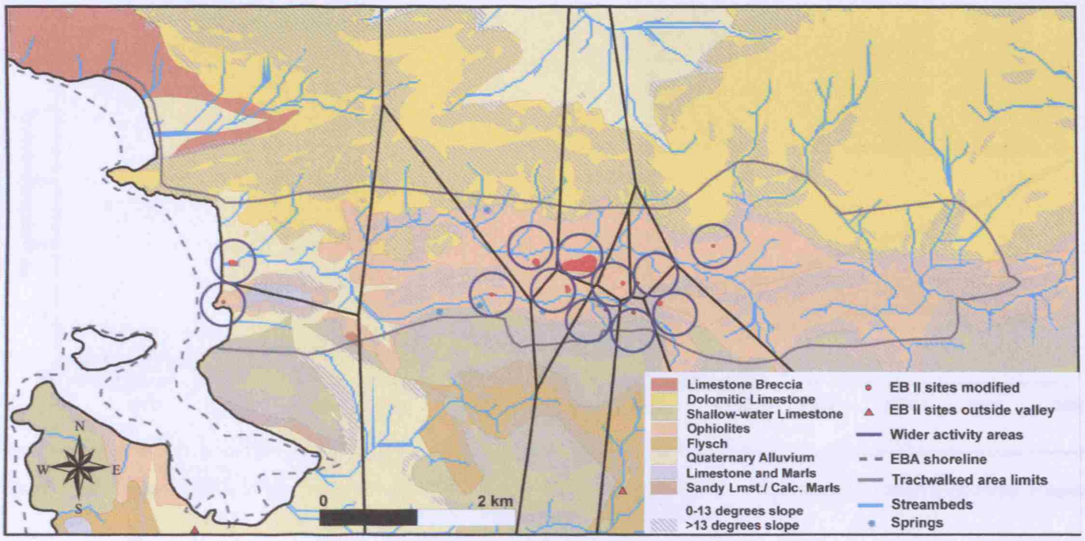
Table 7.6: Household and population numbers for FN-EB I (sites with a minimal component value have been assigned a minimum number of households)

Sites	Component	Site size	All sites individually		Some sites combined	
			600sq.m	1000sq.m	600sq.m	1000sq.m
F01	3	?	1	1	1	1
F05	3	Small	1	1	1	1
F06	3	0.9	15	9	-	-
F13	3	0.45	7	4	7	4
F15	3	0.9	15	9	-	-
F17	3	0.25	4	2	-	-
F19	3	0.15	2	1	-	-
F20	3	0.25	4	2	4	2
F32	3	2	33	20	-	-
F04	2	?	1	1	1	1
F07	2	0.48	8	5	8	5
F18	2	0.2	3	2	-	-
F21	2	0.2	3	2	3	2
F58	2	0.16	3	2	3	2
F23	1	?	1	1	1	1
F29	1	?	1	1	1	1
F18/19	3	0.35	-	-	6	3
Fournoi Focus	3	4.5	-	-	75	45
Total no. of households			**102**	**63**	**103**	**63**
Population if average of 5 persons per household			**510**	**315**	**515**	**315**

Table 7.7: Household and population numbers for EB II (sites with a minimal component value have been assigned a minimum number of households)



a) FN-EB I



b) EB II modified

Figure 7.35: Fournoi Valley sites and their spatial relationship to slope, geology, springs and other nearby non-valley sites; wider activity areas have been shifted to correspond with the Thiessen polygons

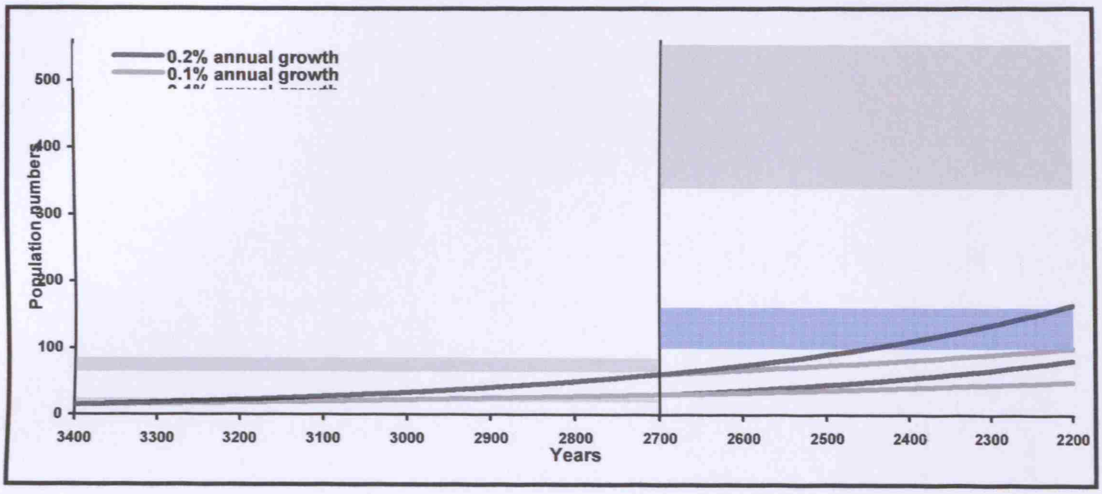


Figure 7.36: Potential population growth for the FN-EB I and EB II at Fournoi; un-weighted population estimates shaded in grey and weighted estimates in blue.

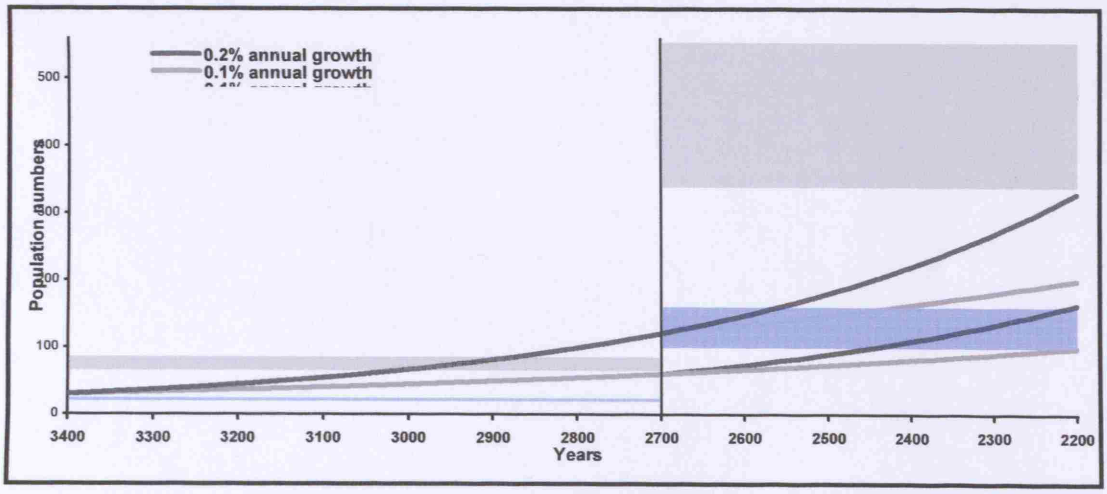


Figure 7.37: Potential population growth for the FN-EB I and EB II at Fournoi; un-weighted population estimates shaded in grey and weighted estimates in blue.